AUG 13 1937

MOTOR AGE

A CHILTON PUBLICATION
DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

AUGUST
1937

IN THIS ISSUE

Just in case you don't notice it, the girl is holding a 1938 California license plate which advertises the 1939 World's Fair.

Engine Repairs Are on the Up Trend

Here is a service story that any one who has had a wrench in his hand will find worth reading.

Current Control Service

If current and voltage regulators have been giving you a headache, here is some aspirin. The second dose will be ready for you in the September issue.

Triple-Duty ARVINS

with Cyclonic-Power Defroster System AND NEW HIGH-HEAT-WAVE RADIATOR

Will Make More Money for You

Why? Because the new Arvins are built with tremendous, extra heating capacity—produce 40% to 50% more heat than last year's world champion models. They do more than keep the car comfortably warm. Arvins give you the extra sales appeal of a 3-way heating system.

Cyclonic-Power Defrosting System—Arvins spread a blast of hot air over the windshield from double defroster outlets. Tailor-fit and universal defroster fittings available for all cars.

Extra Volume Heat Circulation—Arvins keep more heat circulating throughout the car from deflector front.

High Velocity Foot Warmers—Arvins drive a blast of hot air down on the feet from double outlets at bottom of heater.

The secret of the extra heating capacity and tremendous high velocity of the new Arvins lies in the new high-heat-wave triple-tube radiators, extra powerful motors and larger fans. That, plus Arvin's finer appearance and universal public acceptance gives you everything for faster sales.

10 BEAUTIFUL TAUPE AND CHROMIUM MODELS

Tailor-fit heaters for 1937 General Motors and Chrysler-built cars that fit the punch-out holes already in the dash. No drilling required. A big volume Duo-Flow Arvin for all Ford V-8 cars and trucks. Has double inlet and double outlet water pipe connections. A tailor-fit model formed for perfect installation on center of Ford dash. Universal models as low as $9.95 list.

Back of it all is Arvin's big program of national consumer advertising and merchandising. Effective, prospect-stopping displays for counter, show window and floor—plus three special deals that help you make more money selling Arvins.

NOBLITT-SPARKS INDUSTRIES, INC., COLUMBUS, INDIANA
Also makers of Arvin Phantom Filter Radios for car and home.

DOLE THERMOSTATS ASSURE MAXIMUM HEATER EFFICIENCY

ASK YOUR JOBBER ABOUT THE ARVIN No. 12 DEAL

FREE—This smashing, new-type floor display—oil-painted in 5 beautiful colors plus a complete kit of effective merchandising helps, including a giant size wall poster and other selling displays for your counter and show window. All free with the Arvin No. 12 Deal.

Arvin Heater sales last year beat the previous all-time record by 70%

This Sales Kit of ROBERTSHAW AUTOSTATS helps sell a quality line

Here's a sales packet that puts power into thermostat selling. It has everything it takes to tell a water heater buyer why a Robertshaw Autostat will give him more driving comfort — and why he should buy it from you. It's a little dynamo when it comes to generating sales!

It's a complete counter display containing: 8 Robertshaw Autostats — Consumer Folders — Handsome Window Streamer — Robertshaw Autostat Chart — Sales Manual.

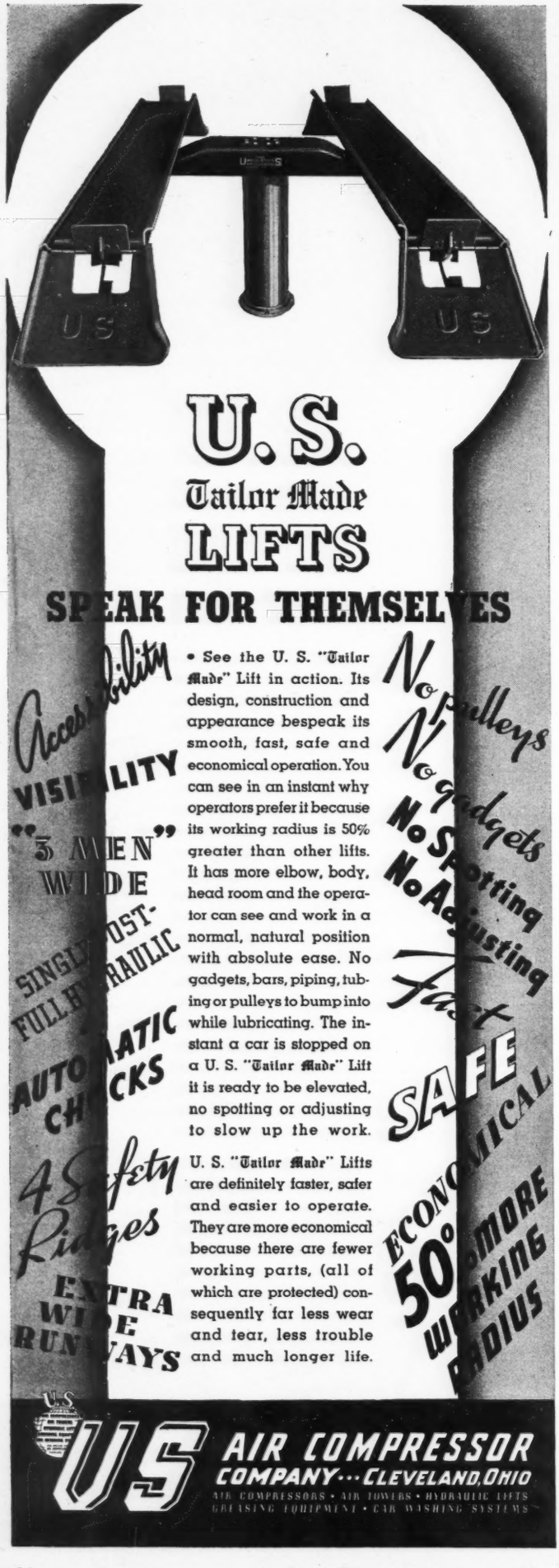
You insure highest heater efficiency when you install Robertshaw Autostats because they give positive motor temperature control under all driving conditions. They are the most powerful thermostats on the market. They use the Sylphon thermostatic principle operating in conjunction with direct-acting poppet valves. They are not affected by water pump pressures or cooling system solutions. They are safe because they open automatically in case of accident.

ROBERTSHAW AUTOSTAT
The Heart of the Water Heater

Robertshaw Autostats Are Manufactured and Sold by

FULTON SYLPHON COMPANY, Knoxville, Tennessee

Service stocks maintained in New York, Chicago, Denver


U.S.
Tailor Made
LIFTS
SPEAK FOR THEMSELVES
Accessibility
VISIBILITY
"3 MEN" WIDE
SINGLE POST-
FULL HYDRAULIC
AUTOMATIC CHECKS
4 Safety Ridges
EXTRA WIDE RUNWAYS
• See the U. S. "Tailor Made" Lift in action. Its design, construction and appearance bespeak its smooth, fast, safe and economical operation. You can see in an instant why operators prefer it because its working radius is 50% greater than other lifts. It has more elbow, body, head room and the operator can see and work in a normal, natural position with absolute ease. No gadgets, bars, piping, tubing or pulleys to bump into while lubricating. The instant a car is stopped on a U. S. "Tailor Made" Lift it is ready to be elevated, no spotting or adjusting to slow up the work.
U. S. "Tailor Made" Lifts are definitely faster, safer and easier to operate. They are more economical because there are fewer working parts, (all of which are protected) consequently far less wear and tear, less trouble and much longer life.
No pulleys
No gadgets
No Spotting
No Adjusting
Fast
SAFE
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50% MORE WORKING RADIUS
US AIR COMPRESSOR COMPANY ··· CLEVELAND, OHIO
AIR COMPRESSORS • AIR TOWERS • HYDRAULIC LIFTS
GREASING EQUIPMENT • CAR WASHING SYSTEMS

MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

Vol. LVI, No. 9 August, 1937

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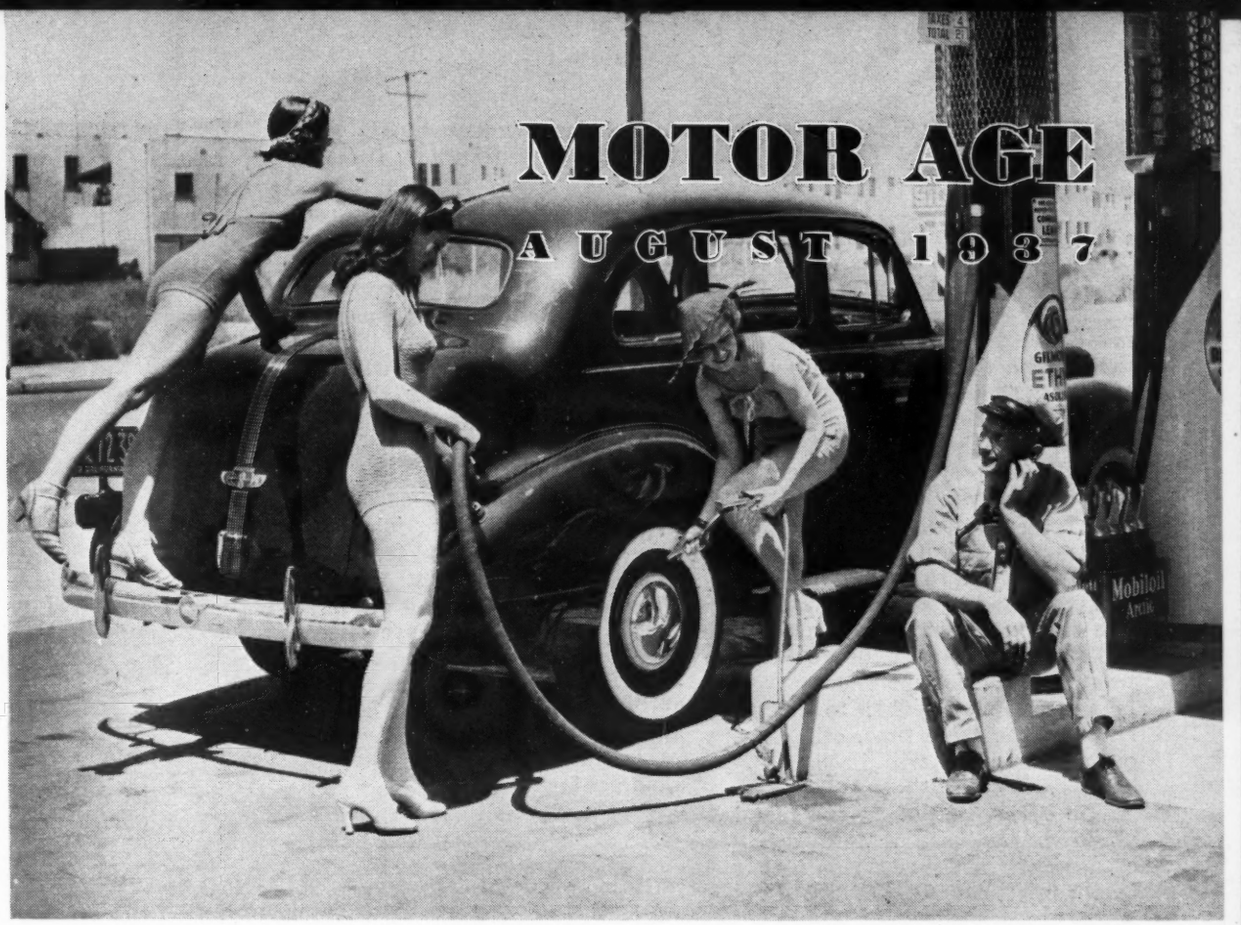

SHOP TALK

Tools From The Stone Age

Bob Erny, at whose shop I just overhauled my car, doesn't employ any dames like those shown in the illustration, otherwise the installation of new rings and the carbon and valve job would have taken even longer than it did. I didn't realize how out of date my kit of tools had become until I really got down in the grease and tried to get some work done. It was mighty good bunch of tools way back when, but they are not worth a damn on today's cars. As a matter of fact, I couldn't have done the job on my car if Bob, his brother Andy, and Stan, their mechanic, hadn't come to my rescue and loaned me whatever I needed from their kits. However, the job is finished, but before I tackle any more work I hope I get a modern set of tools. Believe me, any mechanic that is trying to get along with a set of tools that are not of the latest design, had better get busy, and if necessary hock his watch and get a new kit. Because you can't make any time with old tools and, in many cases, you can't even do the job.

Sex Appeal

But speaking of the illustration, I would think that any shop that has gas pumps could materially increase the sale of gas by using some girls at the pumps—provided they are good looking.

Point With Pride

Well, there is nothing that I have to view with alarm, but I am going to point with pride to the Vanderbilt Cup Race story which appeared in the last issue of MOTOR AGE. The story was written about one week before the race, and I wrote that no American-built car would finish better than fifth place, and then proceeded to pick the first five as follows: Rosemeyer, Nuvolari, Caracciola, Seamen and Farina. Now taking a look at the record we find that the first American car to finish came in seventh, and the first five to place were Rosemeyer, Seamen, Rex Mays, Von Delius and Farina. In other words, I called three out of the five. I've gotten round-shouldered patting myself on the back.

Tough Luck

And speaking of racing, a lot of drivers certainly played me a dirty trick. Here I was all primed to go to Dallas, Texas, for the Pan American 300-mile race, when the drivers refused to enter unless the distance was reduced, with the result that the race was postponed. Yes, sir; it was a dirty trick—I don't often get a good excuse to go to Texas.

Bill Tobolar

Don't

By BILL TOBOLDT

DURING the past few years all the shops have been emphasizing the necessity for proper engine tuning. And rightly so. Modern engines won't perform unless timing, tappet clearance, and breaker points are adjusted in accordance with factory recommendations.

But, and that's a darn big But, too many shops have neglected the fundamental basis of every tune-up job and that's good compression. With everything else perfect an engine won't have enough power to get out of its own way if the compression isn't good.

With the improvement in valve and valve seat material, the life of a carbon and valve job has been prolonged to such a degree that when it does become necessary it is generally advisable to install rings at the same time, otherwise oil consumption will become excessive.

While the life of a valve and ring job has been materially increased, it does not mean that there are fewer jobs of this type being performed. Of course such work, as well as all others, dropped off during the depression. But, and here is another big But, car owners are driving farther each year. It was only a few years ago that 5000 miles per year was a lot of mileage. Now fifteen to twenty thousand is not unusual.

Of even greater importance is the fact that in 1932 and 1933 only 1,096,399 and 1,493,794 cars were sold respectively. It was those cars that found their way to the independent repair shops during the years of 1935 and 1936. Not a very big market as every shop owner knows. However, in 1934 and 1935, 1,888,557 and 2,743,908 cars were sold respectively, and it is those cars which are now in need of valve and ring work. In other words, independent repair shops will have approximately twice the business in 1937 than in 1935.

But to get back to tune-up and compression. Tune-up is important, it's necessary and there is money in it. But don't try to tune an engine that has 25,000 miles on it and expect to get much improvement in performance. It will probably help, but you won't be doing the customer a favor, neither will you get all the profit you should.

The compression should be checked and in the majority of cases a valve and ring job will be indicated. And don't forget the rings, for a carbon and valve job on an engine that has been driven 25,000 miles will increase oil consumption unless the rings are renewed and piston expanders installed. Many shops are also installing packing on the intake valve guides as a further insurance against high oil consumption and poor gasoline mileage.

Another operation which some shops are finding helpful in improving performance and reducing oil consumption is "partial honing." In other words, the hone is run through the cylinders just enough to straighten it by removing the unworn portion at bottom of the bore and the ridge at the top and also any other high spots which may be present. This makes it easier for the piston skirt and expander as it does not have to expand and contract so much with the result that it is a better oil seal.

Of course, cylinder bores and piston should always be measured and if the clearance is in excess of that which can be handled by rings and piston expanders, the cylinders should be completely reconditioned and new pistons, pins and rings installed.

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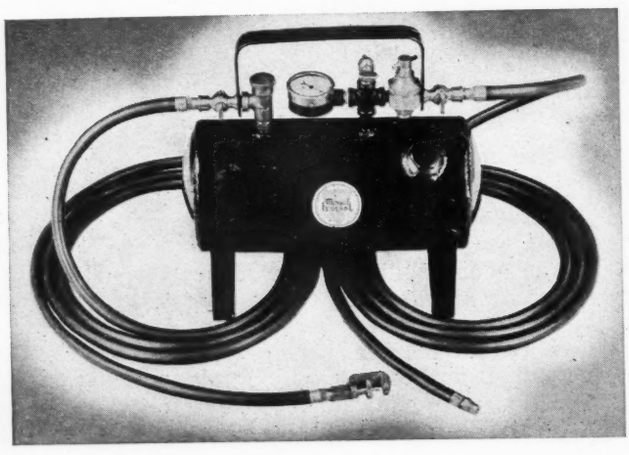
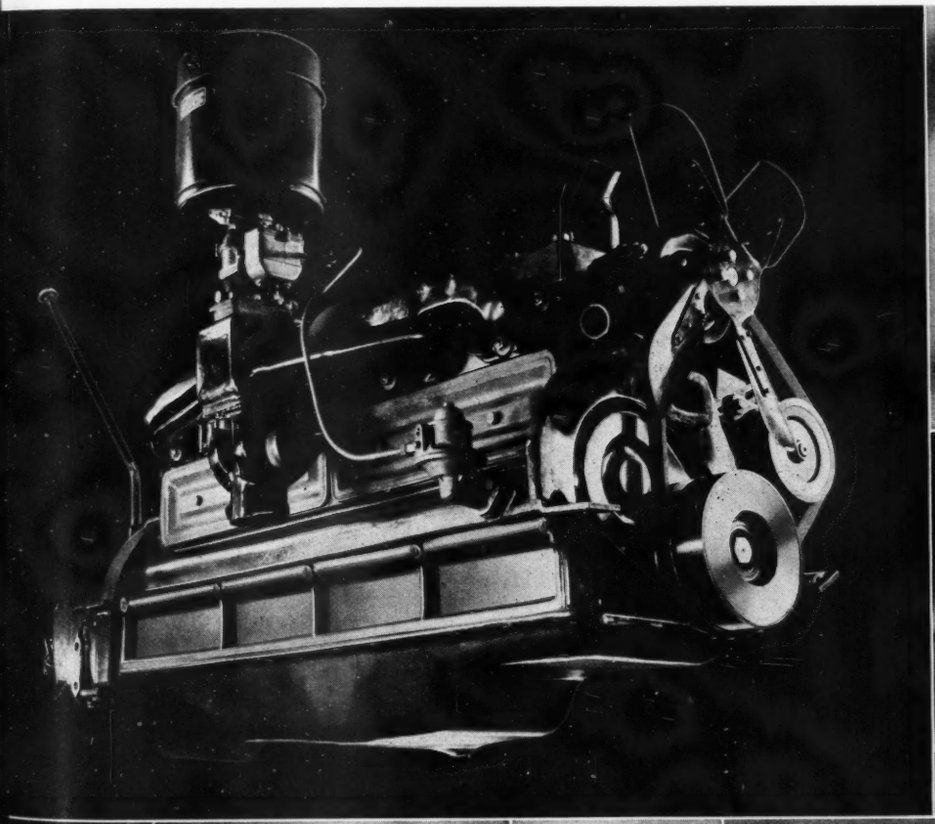
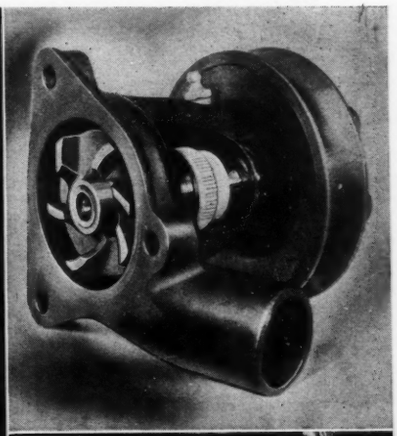


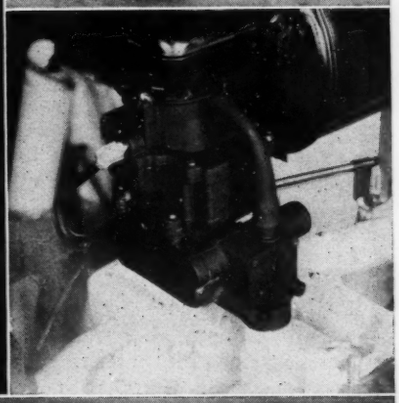
Equipment used in making an oil pressure test on engine bearings. The remaining illustrations show some of the parts that should be checked whenever a ring and valve job is done

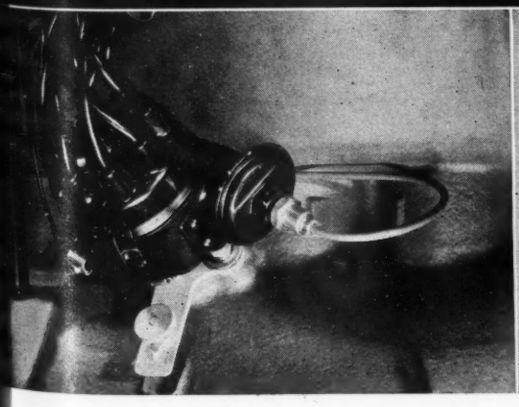
t Forget Compression

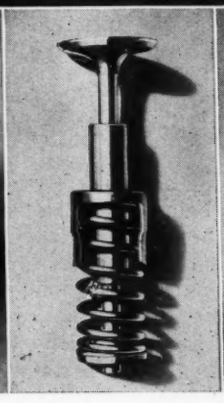
Without it, the best of engines are duds and restoring it yields a good profit from labor and parts. This is a service article for service men

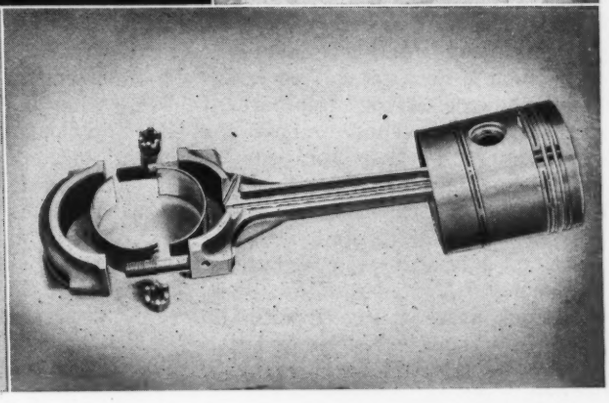












Why Do Repairmen Treat Us So?

THE steadily increasing patronage of women at garages and service stations in recent years stresses the need for shop cleanliness and extra conveniences for the feminine buyer of maintenance.

Women — accustomed to clean, tidy kitchens—allured to smart, attractive women shops—often stop and wonder, as they approach the grease-smudged repair shop, "Why do repairmen treat us so?"

When Smith & Peifly Service Station of Allentown, Pa., built an addition to their building, the alterations were planned with the thought of creating better and more attractive accommodations for its women patrons.

Ezra Smith explained that the interests of women customers was an important factor in planning the new layout.

"During the last few years the number of women customers has increased by about 25 per cent," he said, "and we anticipate that this trend will continue. We found that women seemed to be uncomfortable while waiting around in the office or on the service floor. Unlike the men who come in for service and take an interest in the work that is being done, the women are ill at ease and show their impatience when they have to wait for what they consider a long time. A woman may spend hours just looking at things in a department store, but when she has to wait a short time in a service station with nothing to occupy her mind, she is inclined to think that her time is being wasted.

"To overcome this condition we built a modern rest room on a balcony overlooking the service floor. This room is completely enclosed in glass, while the air that enters the room passes through an air-washing and filtering device to remove objectionable odors and gas fumes. A magazine rack contains the latest issues of women's magazines and a radio has been installed for those who prefer radio entertainment. From this room women can see, if they wish, the work that is being done on their cars, and the comments made on this improvement indicate that women appreciate the efforts we have made to increase their comfort.

"The addition to the building was

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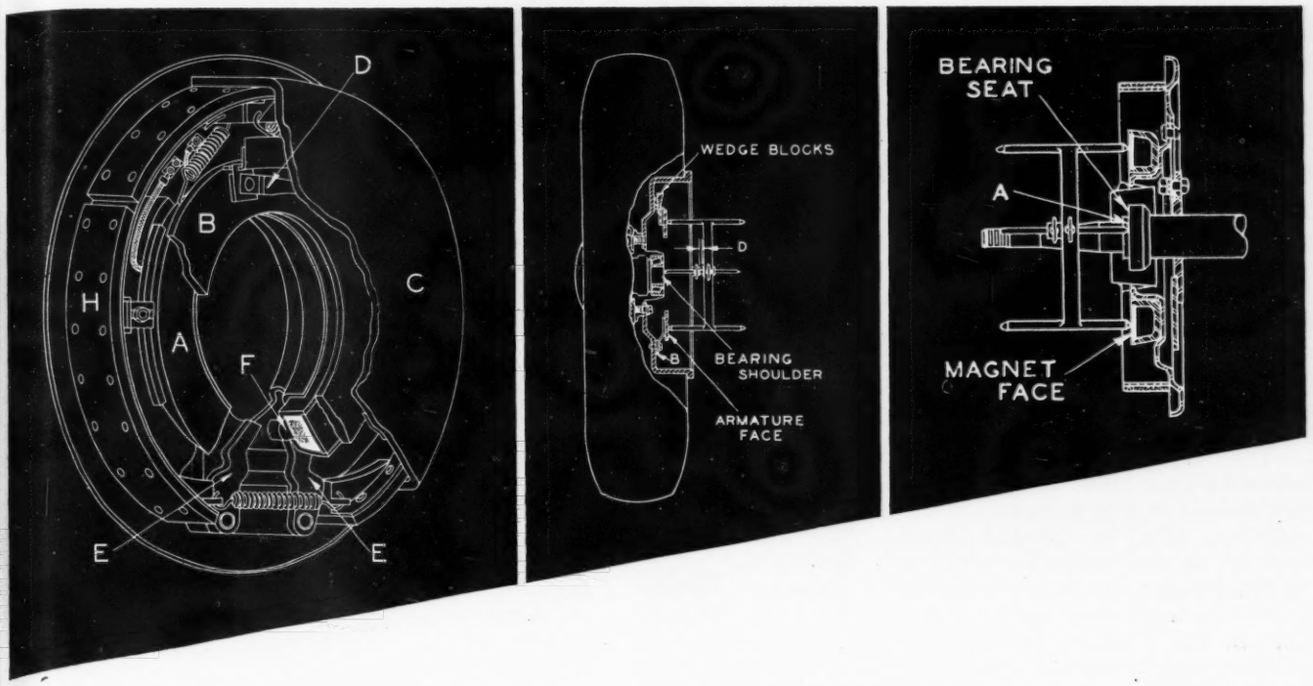

Servicing Warner Electric Brakes

Adjusting procedure on brake system designed for trailer use

WHILE the adjustment of the Warner electric brake as designed for trailers is different than a passenger car brake it is not difficult. The brake consists of the following principal parts: Controller, electro magnet, armature, cam levers, brake band and brake drum.

The CONTROLLER is operated by the brake pedal (or hand lever) and acts as a rheostat to control the amount of current from the storage battery to the ELECTRO MAGNET (A Fig. 1). This electro magnet, which is circular in shape, is free to rotate in either direction within certain limits. It is energized in proportion to the amount of current flowing through it and tends to cling to the ARMATURE (or disk) (B Fig. 1), which is mounted inside the brake drum (C Fig. 1). This armature revolves with the brake drum and is kept in constant contact with the magnet by means of flat springs (D Fig. 1). The farther the brake pedal is depressed, the greater the amount of current that reaches the magnet and the tighter the magnet tends to cling to the armature. This attraction of the magnet to the armature causes the magnet to start turning with the armature (provided, of course, that the wheel is revolving at the time of application). Between the ends of the CAM LEVERS (E Fig. 1) is a lug (F Fig. 1), fastened to the magnet. As the magnet begins to revolve, the lug engages one of the cam levers which pivots on its stud and applies that BRAKE BAND (H Fig. 1) to the DRUM. When wheel is turning in opposite direction, magnet also tends to reverse its direction of rotation and applies brake band through opposite cam lever.

SERVICE INSTRUCTIONS

The Warner Electric Brake is somewhat different from most other brakes as it has no provision for band or shoe adjustment to compensate for wear.

Adjustment of the band is not necessary, as the armature which applies the band through the cam levers is equally effective regardless of the amount which it may travel, up to its limit, at which time it will be necessary to reline the bands.

Before examining the brakes themselves, it is important to check the wiring and controller. The amount of current at each brake may be measured by means of an accurate ammeter connected in series with the brake and the live wire which supplies current to it. The ammeter should read not less than 2.6 amperes and the readings of opposite brakes should not vary more than one-tenth ampere. When

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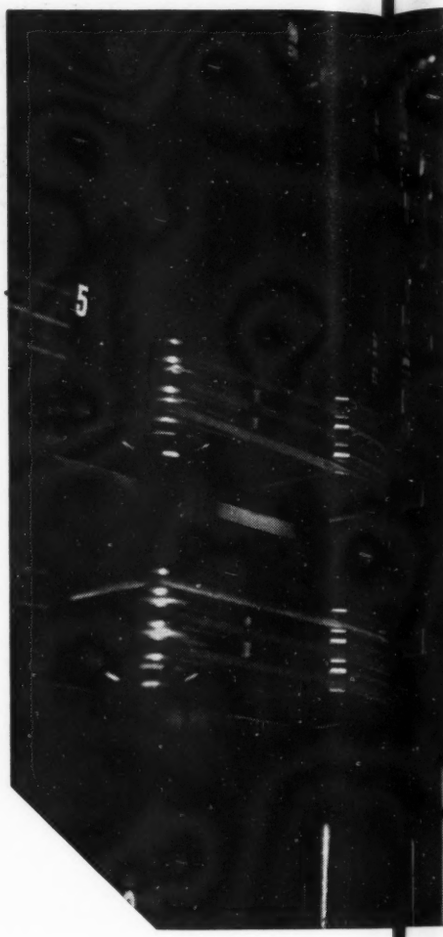


Current

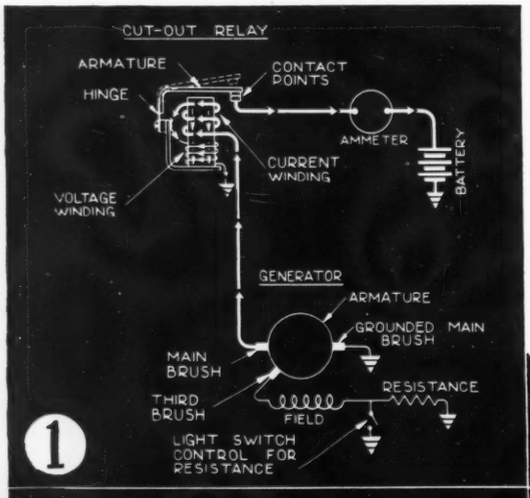
THERE is nothing mysterious about regulators! A regulator is nothing more than a magnetic switch which opens or closes a pair of contacts as the amount of current flowing through its windings increases or decreases.

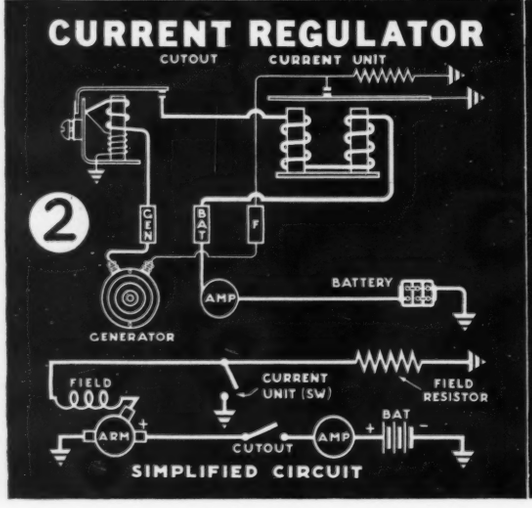
If an armature is made of steel of the proper shape and size and mounted on a hinge in the proper position, it will be attracted to the winding core as current flows through the winding. Restraining spring tension can be arranged so that the current flow must reach a certain value before the electromagnet will be strong enough to pull the armature down to the core. Add a pair of contact points, one stationary and the other on the movable armature, and we have a magnetic switch.

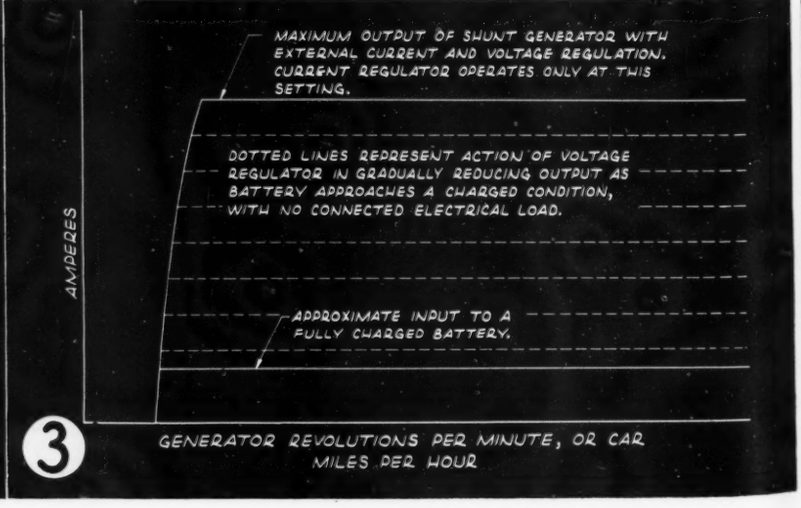
The points can be arranged in two ways so that, as the armature is attracted to the core, the points will either come together or be separated. When the arrangement is such that the points are brought together as the armature moves down, we have the essential features of a cut-out relay.

Illustrated in Figure 1 is a cut-out relay shown schematically. There are two windings, the current or series winding consisting of a few turns of heavy wire which carries the entire generator output, and a voltage or shunt winding consisting of a great many turns of fine wire, which has sufficient resistance to allow only a small current to flow.

The purpose of the cut-out relay is to complete the circuit between the generator and battery when the generator is revolving at generating speed, and to break the circuit when the generator slows






MAXIMUM OUTPUT OF SHUNT GENERATOR WITH EXTERNAL CURRENT AND VOLTAGE REGULATION. CURRENT REGULATOR OPERATES ONLY AT THIS SETTING.
DOTTED LINES REPRESENT ACTION OF VOLTAGE REGULATOR IN GRADUALLY REDUCING OUTPUT AS BATTERY APPROACHES A CHARGED CONDITION, WITH NO CONNECTED ELECTRICAL LOAD.
AMPERES
APPROXIMATE INPUT TO A FULLY CHARGED BATTERY.
3
GENERATOR REVOLUTIONS PER MINUTE, OR CAR MILES PER HOUR

BY WILLIAM H. CRUSE

down below the generating speed.

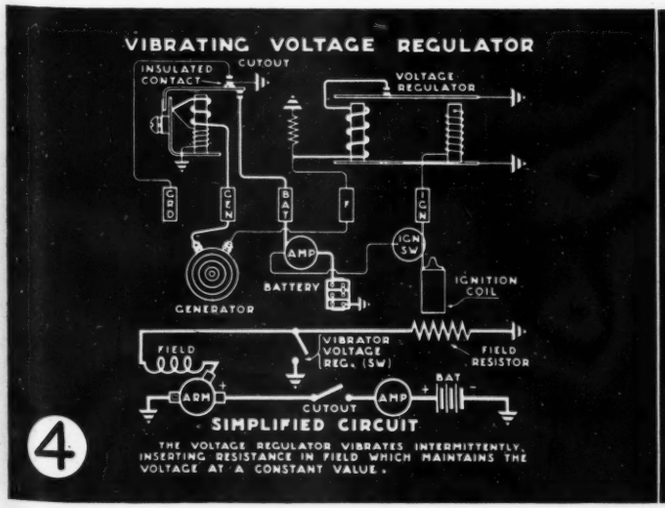
With the generator at rest, the cut-out relay contact points are open. (Shown dotted.) As the generator begins to turn, there is but one path through which current can flow. This is, as indicated by the arrows, through the relay current winding, then the relay voltage winding, to ground, the direction of the magnetic fields being in the same direction.

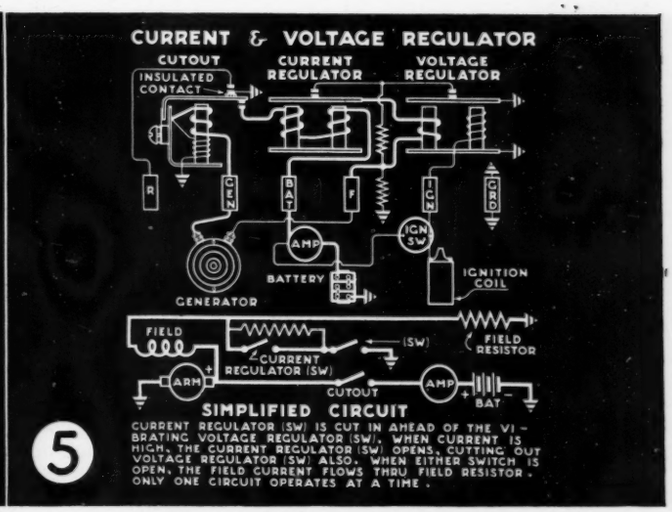
The generator voltage increases with increased speed, causing more current to flow through the cut-out windings. When the voltage reaches the value for which the relay has been set, it is forcing or "pushing" enough current through the windings to create in the relay core sufficient magnetism to overcome the armature spring tension. The armature moves down toward the core, the contact points are closed, and current flows

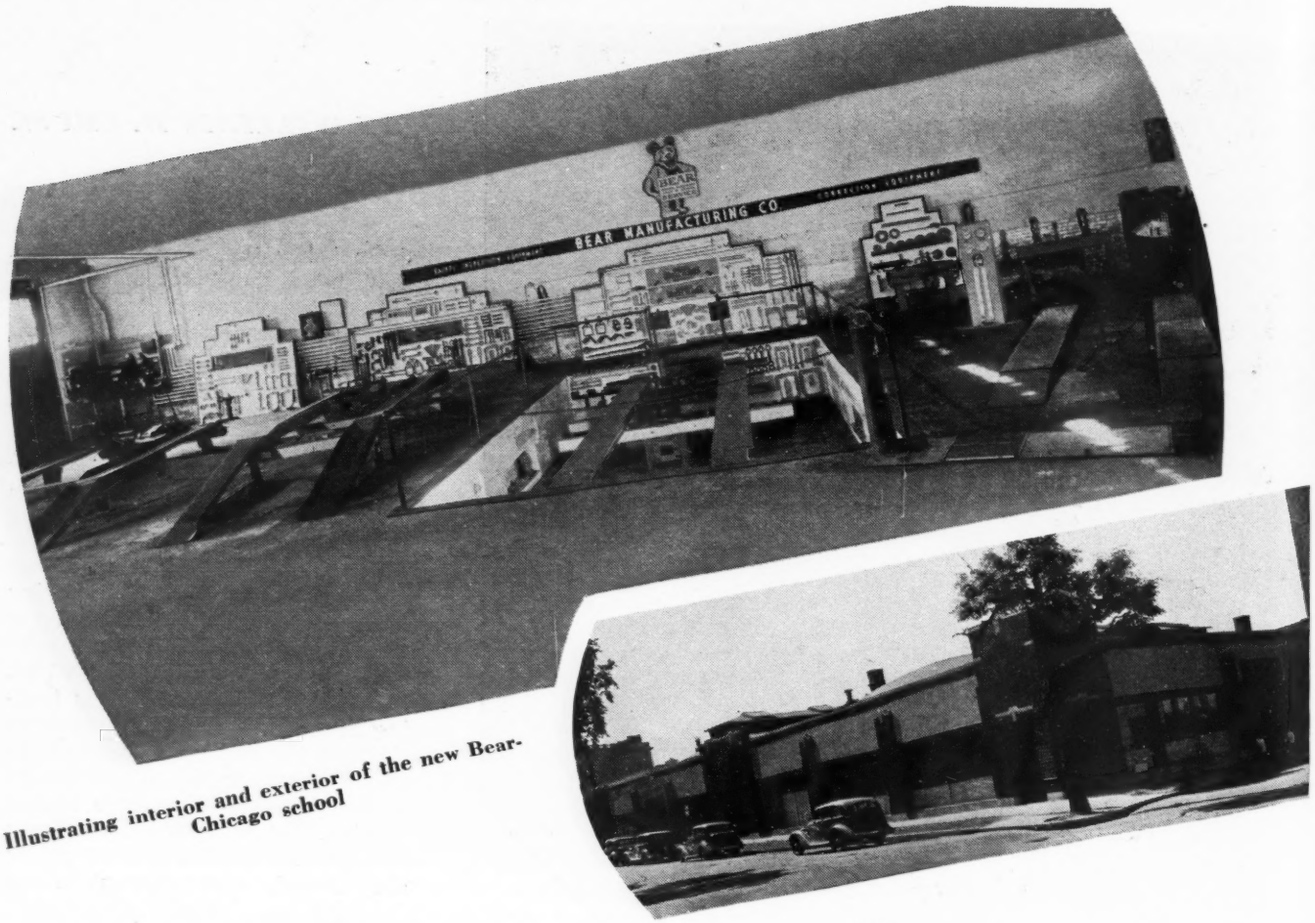
(Continued on page 54)

Control Service

This is the first of two articles which remove the mystery of electrical control unit service







Illustrating interior and exterior of the new Bear-Chicago school

Bear-Chicago School Opened by Will Dammann

Course includes complete instruction on safety maintenance

ANOTHER milestone in the Bear Training School program was marked last month when the Chicago School was moved to larger and finer quarters at Twenty-third Street and Calumet Avenue.

The school, which is under the direction of H. A. Kridler, was officially opened with appropriate ceremonies by Will Dammann, president of the Bear Mfg. Co., Rock Island, Ill. In attendance were officials of the Bear Mfg. Co., and a large group of Service Shop operators and mechanics.

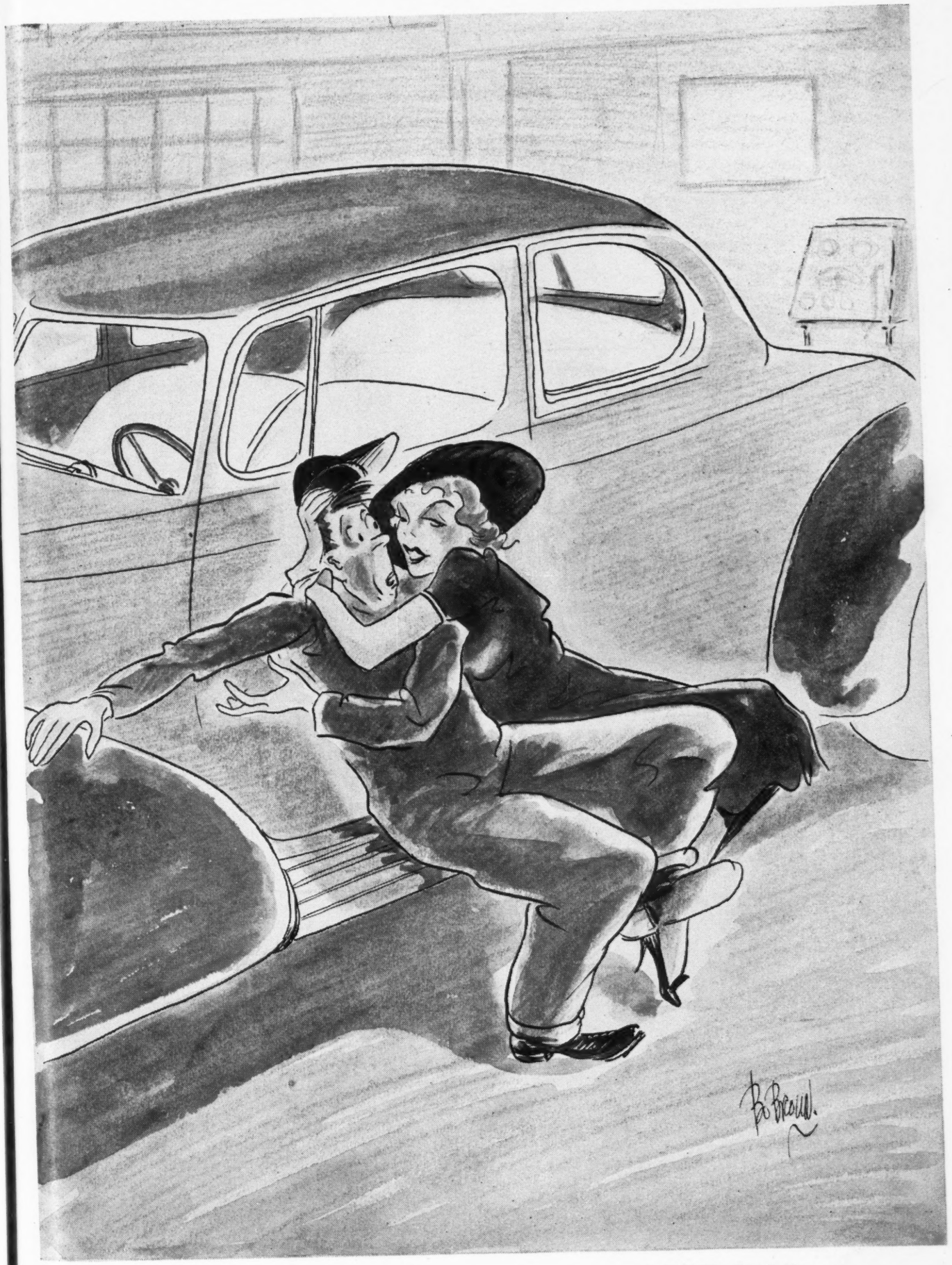
The event is of noteworthy interest to the automotive service industry, for it is evidence of the growing momentum of the safety movement and the definite trend toward the better training of automotive service men.

"The purpose of this school," explains Will Dammann, "is threefold. First, it is the place where mechanics from all over the Middle West may come for free instruction on Bear alinement service and the Safety Testing of automobiles. Second, it serves as a sort of model home to which automotive service men may come for ideas as to how the modern repair shop should be equipped and operated. Three, it provides a place where Bear service station operators may come and see how by the addition of a few tools, gauges and small parts even the operator with the oldest types of Bear equipment may bring his equipment up to date to service the latest model cars.

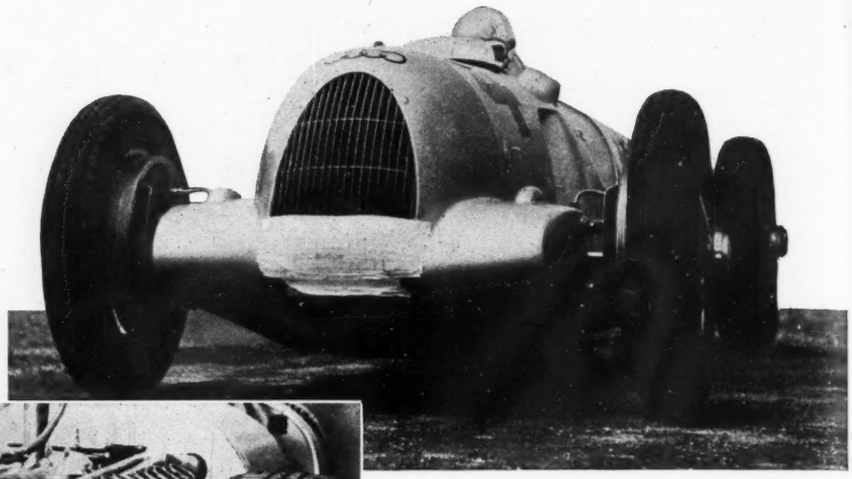
Here under one roof, is assembled all of the latest equipment required to make the modern automobile safe to drive. And that includes not only those cars which through the ordinary course of driving require correction work but also those which have been in collisions or accidents.

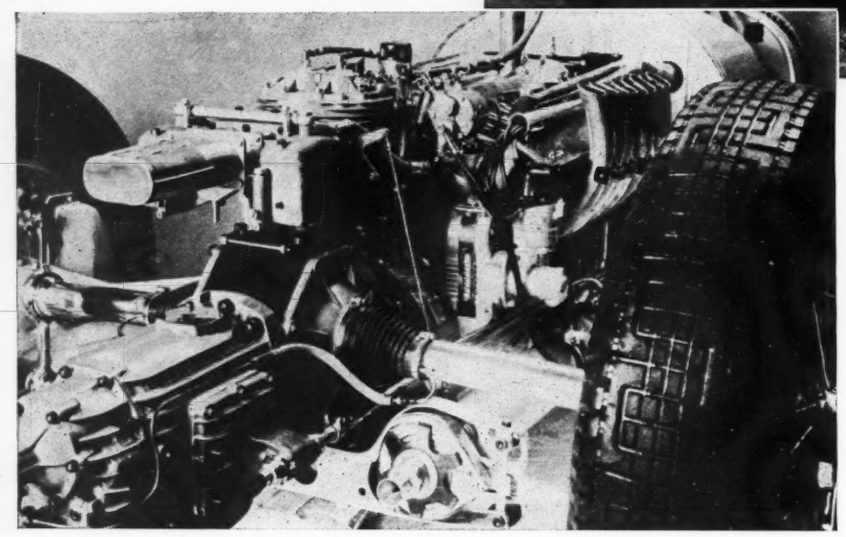
"The course, therefore, includes the theory and practical experience in (1) frame straightening, (2) axle straightening, (3) steering correction, (4) wheel straightening, (5) wheel alinement, (6) brake testing, (7) headlight testing and adjustment. Our students are taught to be expert trouble shooters, to learn what to look for and how to go about looking for it without waste of time, thus saving the car owner money and building a reputation for the shop.

(Continued on page 50)



"I take it all back Miss—There's nothing wrong with YOUR clutch."





The winning Auto Union, with details of the power plant

Analyzing Results of Vanderbilt Race

Money is needed to bring American Racing car design up to the standards set by Europe

THEY did it again—the foreign-built cars showed the American-made racing creations what a really good racing car is like. For the second time we had to sit back and watch seven out of the first ten positions in the George Vanderbilt Cup Race go to drivers of cars built across the water. The fact that three American-made cars finished in the first ten was due to the fact that some of the foreign cars developed mechanical trouble early in the race and had to drop out, and so made room for us.

If there is a balm to heal the wounded pride of the 70,000 racing fans who witnessed the classic and the untold thousands who are interested in the sport, it is the fact that the race proved beyond a shadow of a doubt that American knights of the road can hold their own with the best that Europe has to offer if they are given cars that are comparable in speed and performance with those of the foreign drivers. The spectacular driving of Rex Mays in his Alfa Romeo, the steady determination of Joe Thorne in another Alfa Romeo, and Wilbur Shaw's refusal to quit in the face of extreme discomfort when his Maserati broke the exhaust pipe connection at the manifold and poured a direct exhaust within 3 ft. of his face during the major part of the race, all proved the skill and daring of the American drivers in foreign-built cars.

But the fact remains that American-made cars had nothing new to offer in the way of mechanical improvements over the run-of-the-mine racing cars that have been in use here for the past five years. Nothing that would lead the most optimistic fan to even hope that they had a chance to win in the face of such competition. It is quite apparent that if we are to compete with Auto Union, Mercedes-Benz, Alfa Romeo and Maserati cars, something very drastic will have to be done to raise our standards of design and construction.

But it must be remembered that the foreign entrants had not only factory but also government backing, while our cars are the result of individual effort. Given equal financial backing the results of the Vanderbilt race would have been a different story.

We have done very well with our 4-cylinder engines in the past, but racing has evidently outgrown that

(Continued on page 51)

Can a Repair Shop Make Money on I.O.U.'s

Dayton Serviceman learns how to handle customers and cut down credit losses. Here's how he does it

A WELL-OILED system of credits on the sale of tires, batteries, gasoline and oil enables Roy Sollenberger, who operates a small super-service station in Dayton, Ohio, to do a monthly business of $3,000 with surprisingly few losses.

Mr. Sollenberger operated with a bad debt loss of only 2 per cent of his gross business last year. Previously, he had a loss of only ½ per cent. The increase was due to more business. He figures he can safely lose 2 to 3 per cent on the volume he does.

"When a customer asks me for some gasoline on time," said Mr. Sollenberger in explaining his method, "I trust him, if I know him. When I say I 'know' him, I mean he has dealt with me for a period of a year or two. I know where he lives, where he is employed, and I have gained a good impression of him. But even then I give him to understand that I am to get my money the following pay day, or at the time he promises me he expects to be able to pay me.

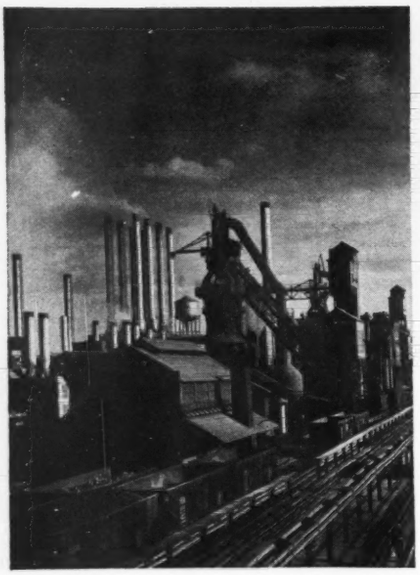
"If a stranger asks me for credit, I get all the facts I can about him. I ask him who sent him, where he works, and how long he has been working at his present place of employment. If he says he has been working at a certain place of business or factory for, say, only a month or two, I tell him I can't give him any credit. I explain that he is not sure enough of his job, having worked there only that length of time. Maybe he won't like it, but experience has taught me I can't afford to take on such an account.

"Oftentimes the prospective customer has been sent to me by somebody who has been dealing at my place for years. In such cases I am usually in a safer spot. But I explain that he must settle with me on pay day. I don't get harsh, but I take the attitude that the fellow is all right until he proves otherwise.

"I don't give credit to WPA workers, but have some good accounts among fellows who are using trucks on WPA jobs. I watch these accounts closely, however. Recently I took money with me to the place where a couple of my delinquent truckers were getting paid off, cashed their checks for them on the spot, and took out what they owed me. They didn't like it, but I'd rather lose such customers.

"If a fellow is buying from me and doesn't pay when he gets his money, I go out to his house and find out the reason why. I'll accept any reasonable excuse, but I'll never let the fellow get the impression I am weak on collections. If he con-

(Continued on page 45)



Service Hints

From the Factories

Dictator Axles

Emergency Adjustment of Rear Axle Pinion Without Use of Pinion Setting Tool

(All 1934 Models, 1935 Dictator Models, All 1936-7 Models and Rockne Cars)

Although the regular pinion setting fixture is recommended as a time and trouble saver, in the installation of a new ring gear and pinion, or adjustment of these gears, in an axle where the pinion adjustment is controlled by shims the operation can be performed in an emergency as follows:

First, make absolutely sure that the arrangement of the shims, used in connection with the old pinion, is not disturbed. Then, compare the markings on the end of the old and new pinions. If the markings should, by chance, be the same, then the shims can be used with the new pinion in their original arrangement. If, however, there is a difference in the markings, it will be necessary to change the arrangement of the shims according to the difference in markings. For example, if the old pinion carries a mark "+3" and the new pinion carries an "O" marking, it will then be necessary to move the pinion, by means of the shims, .003 in. toward the rear of the car.

As another example suppose the original pinion carried a "—2" marking, and the new pinion carried a "+1" marking. The difference in readings in this case is .003 in. and would mean that the new pinion would necessarily have to be placed .003 in. farther toward the front of the car than the old pinion.

As Studebaker service men should know, the markings on the end of the pinion indicate, for servicing purposes, the distance of the end of the pinion from the center of the ring gear. A plus marking indicates that this distance is greater than that established as standard and a minus marking indicates that the distance is less than standard.

By carefully preserving the original arrangement of the shims, and if necessary, moving the proper amount of shims, as determined by a micrometer, the proper setting of the new pinion can be obtained by comparing the markings as described in the preceding paragraph.

The above operation is described for the benefit of the dealer who may be called upon to install rear axle gears in a Spicer axle and who does not feel that he is in a position to purchase the proper axle setting fixture. As a minimum requirement, the following tools will be required if the operation is to be successfully performed. They can be ordered in the usual manner from our Service Tool and Equipment Division:

Rear Axle Pinion Bearing Cup Replacer Set:

J-270-1 Handle—All Models listed

J-270-6 Adapter — All Dictator, Rockne and Commander B Models

J-270-8 Adapter—President C

Expansion Bushing and Arbor for Removing Pinion Bearing Cups:

J-356—Arbor and Adapter

J-591—Adapter

Differential Side Bearing Puller (Including 2 Adapters):

HM-872—All above models

Universal Dial Indicator (Starrett)

The operations described in the preceding paragraphs should be followed, as in any axle adjustment by a careful checking of the tooth bearings, using red lead.

Buick Pump

If either pump bushing on any 1937 Buick car is removed for any reason it will be necessary to replace both bushings and the packing assembly.

Olds Piston Pins

Since the piston pin bosses in the pistons of 1937 Oldsmobile engines are electrolited, bosses must not be reamed for installation of oversize pins. Therefore, standard size pins only are serviced. Standard size pins will be supplied with oversize pistons.

Water Level on Fords

The appearance of water in the top tank where the filler neck is located on 1937 Ford cars does not necessarily mean a sufficient water level in the radiator. The water should at least appear in the filler neck baffle and should be maintained at a level not higher than two inches from the top of the filler neck.

Cadillac-La Salle Rod Bearings

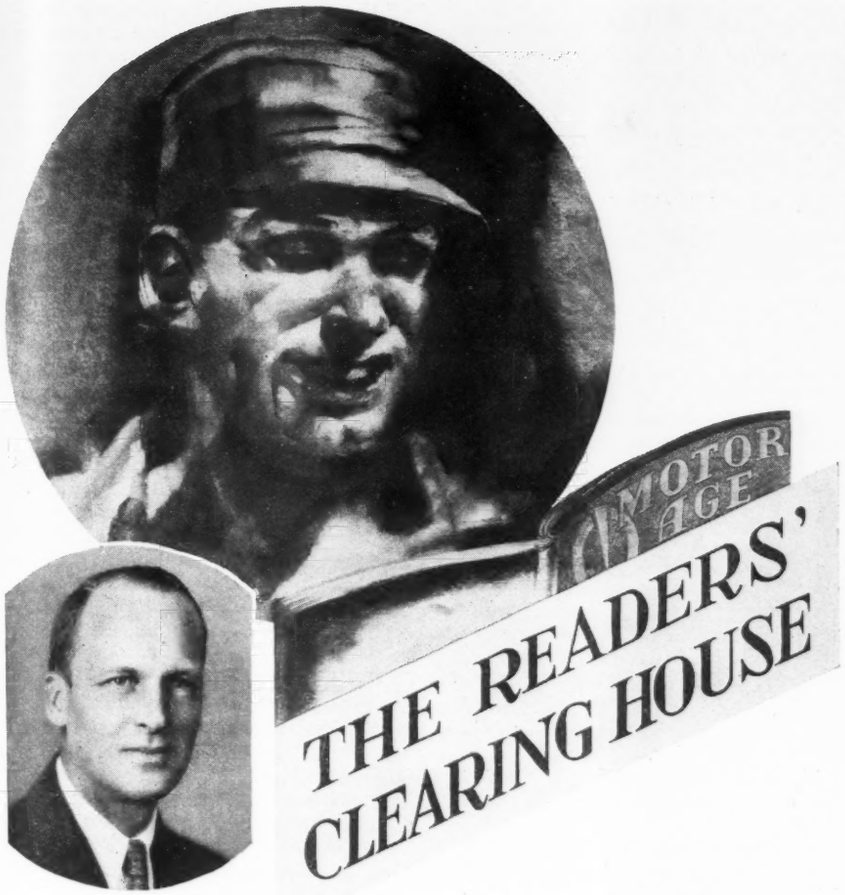
The upper and lower halves of the connecting rod bearings used in the La Salle 37-50 and Cadillac 60, 65, 70 and 75 engines are not interchangeable because of the holes in the upper bearing for the oil passages in the body of the connecting rod. Extreme care should be exercised when installing these connecting rod bearings to make sure that the upper half is installed in the top of the rod or no oil will reach the piston pins and cylinder walls.

Buick Manifold Gaskets

When replacing manifold gaskets on 1937 Buick cars the side of the gasket next to the manifold should be lubricated with a graphite lubricant. This will allow the manifold to slide enough to make up for the difference in expansion between the cylinder head and the manifold.

Wet Type Air Cleaners

A few instances of difficulty in the way of a noise or a rattle in the wet type air cleaners as used on 1937 model cars has been encountered which is caused by the retainer working loose and falling out of position. This retainer is located above the carburetor inlet and serves to keep the felt lining of that portion of the cleaner in position. If the retainer works loose causing a rattle it should be pushed back into position. A hole should then be drilled in the cleaner directly opposite the outlet of the cleaner or directly above the carburetor inlet and the felt held permanently in position by means of a screw, washer and nut. With the liner held in this position it will also serve to keep the retainer in proper location.



BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of Motor Age together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.

Machining Head to Increase Compression

Some time ago I read an article in the Motor Age *about machining cylinder heads off to increase compression ratios.*

What per cent of increase in power can be gained by doing this? Also, will the gasoline consumption increase?

We have a 1929 Dodge Victory Six that has been rebored to .030 O.S. and in good shape. How much should be machined off the head on this car, as we feel that we would like to try this method out. Leslie M. Ward, 352 Lincoln Ave., Council Bluffs, Iowa.

IT is rather difficult to give a specific answer to your question regarding the percentage increase in power obtained as a result of increasing compression ratio. However, several years ago, I increased the compression ratio on a Model A Ford from the standard ratio of approximately 4.7 to 6.00 to 1 and, as a result, the top speed was increased approximately 10 miles per hour. The gasoline consumption is decreased when compression ratio is raised.

When you rebored your Dodge Victory Six, .030 in. oversize, you increased the compression ratio a slight amount. I think you can raise it still further by milling off about .060 inch from the cylinder head. When this is done, it usually means that you have to use premium gasoline and also retard the spark slightly.

Test Oil Pressure

We have a series 18A Franklin Olympic on which the oil pressure drops down to zero after the car has been driven about 20 miles.

We have installed new main bearings line reamed to .002 clearance, new connecting rod bearing inserts and partly closed the opening to the filter and also the line running to the generator shaft bearing from the front end of the main oil line but none of these things seem to help any. The oil pump checks O.K. and have tried two or three different by-pass valves.

It has been suggested to us to retighten all of the bearings. If you think this advisable what would be the most satisfactory method of doing this as both the connecting rods and main bearings are slip-in type bearings. Would you file the caps or put shims between the caps and inserts?

Will you please send us a diagram of the oil pressure tank for testing bearings that I understand you published in the Motor Age *sometime ago as one of these might enable us to locate our trouble.*

We have just subscribed to your Motor Age *and bought one of your new Chilton Flat Rate Manuals and I am sure we will like them both. C. L. E., Atlanta, Ga.*

I CERTAINLY would not attempt to tighten up the bearings on your Franklin until I was absolutely sure what was causing the loss in oil pressure. The only way to ascertain this is by means of an oil pressure test and I am mailing an article which includes the description of this test. One thing I would pay particular attention to is oil losses at the rocker arms.

Stumping the Editor

We have been a user of the Chilton Flat Rate Manual since 1927 and would not be without its helpful service. But now we wish to see if we can stump the Editor. We would like to get reliable information concerning the building of a transformer type welder to operate from the power line —220 volt to give us heat ranges from say 25 amps to around 265 amps. We would like to get this information in the form of a blue print or a book.

We have tried several places to no avail, so just the other day when your agent, Mr. H. H. Banks, came through he said write to you, that you knew everything or where it could be had. So, here I am. Harvey E. Dierks, Dierks Bros. Garage, Cutler, Calif.

I CERTAINLY wish that I could live up to the reputation our Mr. H. H. Banks has given me when he said that I knew everything. So far, there are at least five million things I don't know and among that number is how to build a transformer type welder. As far as I have been able to learn, the only companies that know how to build them are the General Electric Co., 1 River Road, Schenectady, N. Y., and the Marquette Mfg. Co., 409 N.E. Johnson St., Minneapolis, Minn., and, unfortunately, they won't tell.

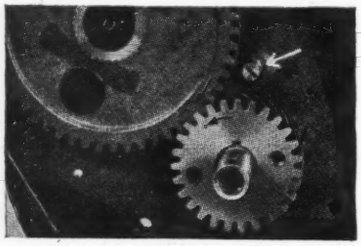
While I think that you would be better off if you bought the equipment

ready-built—still that doesn't answer your problem of how to build one, since that's what you want to do. Perhaps some of the readers can help.

More Oil Trouble

We have a 1936 Standard Chevrolet which throws about four quarts of oil out through the front end of the crankshaft every 800 miles. Also have same trouble with a 1932 Chevrolet. Have installed a ring job also a front seal (1932). R. W. Moug, Russell's Auto Service, Chicago, Ill.

ON your 1936 and your 1932 Chevrolet that loses a lot of oil out of the front end of the crankcase, I would suggest that you make a care-



ful check to be sure that the drain from the timing case into the oil pan is clear and not obstructed with a portion of the gasket or other sediment.

This is in addition, of course, to the seal which I understand you have replaced on the 1932 model. Some of the Chevrolets have a sheet metal oil deflector. This should also be replaced if it has been bent.

How to Increase Compression Ratio

I have a Buick 1931 Model 57 light eight. I wish to increase the compression ratio. How much can be taken off the head and what else will have to be done. Would like to have all the information on this job. John A. Ballman, 1656 S. Meridian St., Indianapolis, Id.

ON your 1931 Model 57 Buick you can mill .085 in. from the top of the cylinder block so as to increase the compression ratio. To remove more than this would result in detonation. After removing this amount from the cylinder block, it will be necessary to use premium gasoline and it will also be necessary to retard the spark slightly. The amount the spark will have to be retarded will, of course, be done by actual checking on a road test.

Removing that amount from the cylinder block will increase the compression ratio to approximately 5.25 to 1. As you know, the overhead valve jobs do not run as high compression ratios as the L-head jobs do.

Using Castor Oil

Can castor oil be used in the crankcase of a 34 V-8 Ford? Is it advisable or not? If not, please explain. J. O. Petterson, 4180 Maryland, Detroit, Mich.

I DO not think that it is advisable to use castor oil in any part of a passenger car. The reason for this is that castor oil gums very badly with the result that it is necessary to clean out the oil pan and oil passages after nearly every run.

Castor oil is used in race cars but a race car is torn down immediately after the race and one of the main reasons is to clean out all the gummed oil.

Car Has Ringing Noise

One of my customers has an Oldsmobile Six, and I can't find out where a peculiar noise is coming from. It is a continuous sound that has a ring to it, and gets louder as the car speed increases. Sounds like something rubbing on a steel pipe.

This is a 1935 model with 18,000 miles on it, and this noise has been present for the last 8000 miles. Doesn't seem to do any harm, but I feel that it is something that should be corrected.

What can you do about this? A New York Subscriber.

I THINK I know what the trouble is. It is a bad pinion shaft bearing. This is a double row ball bearing, preloaded, and it is possible that it was pre-loaded too heavily. The only answer is to replace the bearing.

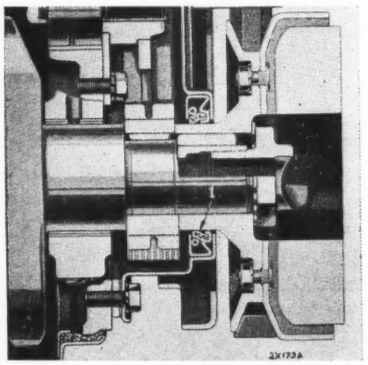
This job can be done without pulling the differential out from under the car. Break the line at the rear universal joint and jack up one wheel. Remove the cap screws from around the pinion bearing collar on the front of the differential and then you can work the collar, which is really the bearing retainer, out toward the front, pulling the pinion shaft and pinion along with it. Be careful not to damage the shims, as they must be put back to maintain the correct pinion adjustment. The bearing should be pressed off the pinion shaft, and the new bearing pressed on; do not use a punch as this is certain to damage the bearing. Reassembling is done in the reverse order, and then you will not have to readjust the pinion if the same number of shims are reinstalled.

Squealing Engine

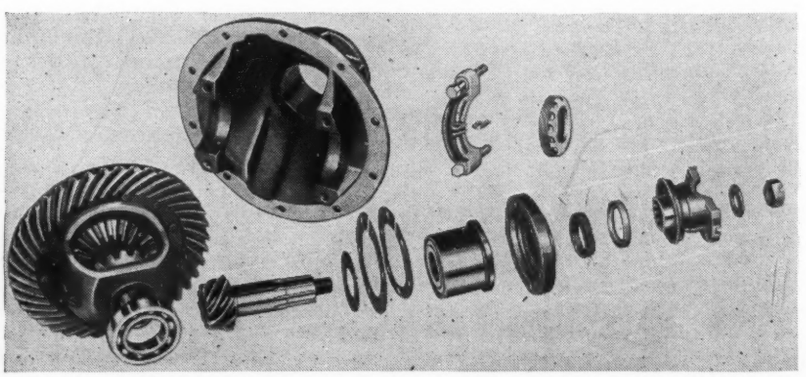
Here's one for you. One of my customers has been complaining of a squeal in the engine of his 1936 Chrysler, and so far I have been unable to get it out.

This noise is between a squeal and a whistle, and comes and goes, regardless of engine speed. At first I thought it was caused by the water pump, but since installing a complete new pump the noise is still there. I have checked the fan belt, generator brushes and everything else I can think of, but nothing does the trick. Can you help me? A Massachusetts Subscriber.

THIS is a puzzler, but I believe I have the answer for you. I heard of a similar case recently, and the noise was found to be caused by the oil seal on the front of the crankshaft in the timing chain compartment. This oil seal had become hard and glazed



and would set up a piercing squeal that would last for only about half a minute and then quit. Installing a new oil seal corrected the trouble, and I suggest that you try this since you are satisfied that it is not caused by the water pump.



Clutch Chatter

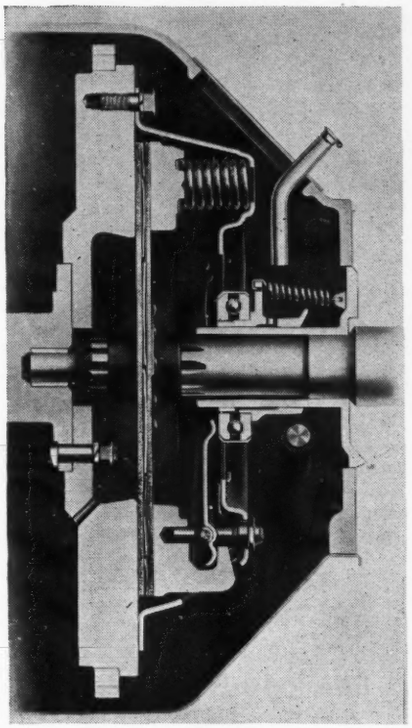
Having been a consistent reader of your excellent publication, Motor Age, *since its inception and having read with interest the many and varied appeals for technical information on the troubles of the service men, I am likewise asking for a little light on the question of a chattering clutch in a 1931 PA Plymouth, 4 cylinder—the first model with the Floating Power.*

Might say that this clutch has been rebuilt three times with all new parts with the same results. It is perfect according to all specifications yet it chatters just as badly as ever. Could it be the rubber mountings? These have been replaced once. Could it be the springs sagging in the rear? It does it either loaded or empty. Could it be that the transmission is out of line and how will we determine that? This car has never been in a wreck and is mechanically almost perfect as far as can be determined. F. S. Mehollin, The E. M. Long Corp., Cadiz, Ohio.

ON the clutch on your 1931 Plymouth, I would suggest that you install new rubber engine mountings as they are contributing factors to poor clutch operation. I note that you say that the clutch has been rebuilt. If the clutch shaft has not been checked for alignment or trueness, I suggest that you check it between centers on a lathe to make sure that it is not sprung. I would also make sure that the bell housing is true and also that the flywheel housing is true. Of course, the only way to do this is by means of a dial gage.

To check the surface of the bell housing and flywheel, first mount the

"Susan, that mechanic you always take the car to, has wiped his hands on the steering wheel again."



dial gage on the edge of the flywheel housing with the butt contacting the flywheel. Crank the engine slowly and note the reading of the dial gage. The reading should not vary more than .003 inch. Then, mount the dial gage on the flywheel with the button contacting the machined surface of the flywheel housing. Again crank the engine and note the dial gage reading. Here again the reading should not vary more than .003 in.

Then, with the transmission on the bench, install a dummy shaft in place of the clutch shaft and transmission main shaft and have the dummy shaft extending out into the bell housing. Mount the dial gage on the end of the dummy shaft with the button contacting the machined surface of the bell housing. Rotate the dummy shaft and the reading of the dial gage should not vary more than .003 in.

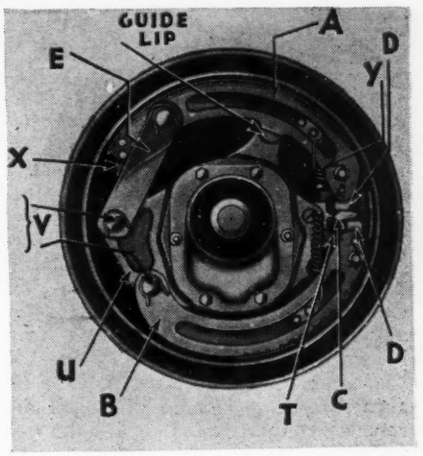
Huck Not Bendix

I am having a lot of trouble with a set of Bendix mechanical brakes on a 35-40 Buick. I relined the shoes. Installed lining marked primary on primary shoes and secondary on shoes marked S. Installed shoes and springs in their proper place. Adjusted them like I have been told of other jobs with the same brakes. Greased all the cables but they won't stop. Good only in wet weather. Please give me all the dope on these brakes. Jake's Service Garage, Chickasha, Okla.

I WAS very much interested in the trouble you are experiencing with the brakes on a 35-40 Buick.

The 1935 Buicks gave some trouble with rain getting into the drum and the factory supplied a shield which can be attached to the backing plate to prevent the entrance of rain into the brakes. I suggest that you install these shields because after you once get the brakes working right, they will grab plenty when they are wet.

All of this is assuming, of course, that you have adjusted the brakes properly. Just to be sure that you have the right adjusting instructions, I am sending you a couple of sheets taken from our Brake Book and if you will follow the instructions step-by-step, you should have no trouble.



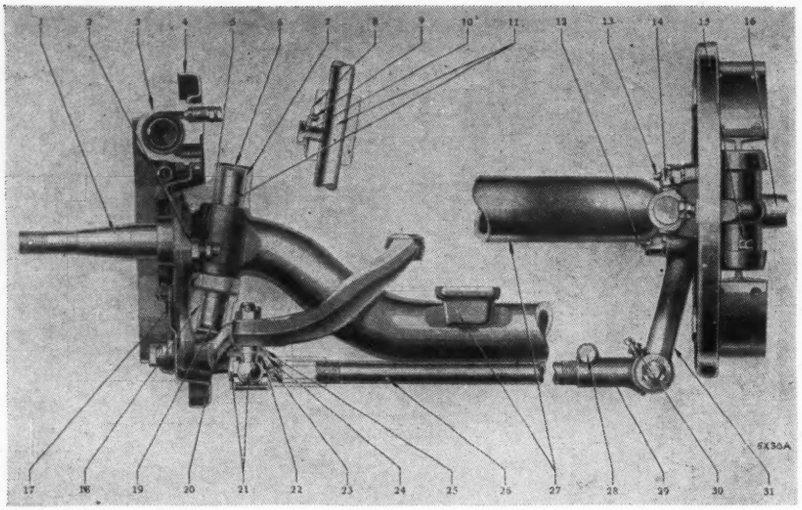
Ford Shop Hint

The job of removing the oil pan on 1935, 1936 and 1937 Ford engines can be greatly simplified by using the following procedure: Disconnect radius rod at the rear end and disconnect the exhaust pipe flange. Take out the two bolts holding the engine in the chassis at the front. Then raise the front of the engine by placing a jack under the oil pan, taking care to protect the oil pan with a block of wood placed over the head of the jack. Then insert a 2-in. block of wood between each motor leg and the sub-frame.

By means of a chain hoist raise the front of the car until the weight is taken from the front wheels. Remove cap screws from oil pan and drop the pan far enough to permit removal of the oil pump retaining screw. The oil pump will then drop into the pan. and there will be no further difficulty in removing the oil pan.

Wanders at 45

What do you do with a 1936 Plymouth that wanders at about 45 to 50 miles per hour, particularly in a cross wind? We have checked this job very carefully on our front end equipment, and the caster, camber and toe-in are set exactly according to factory rec-



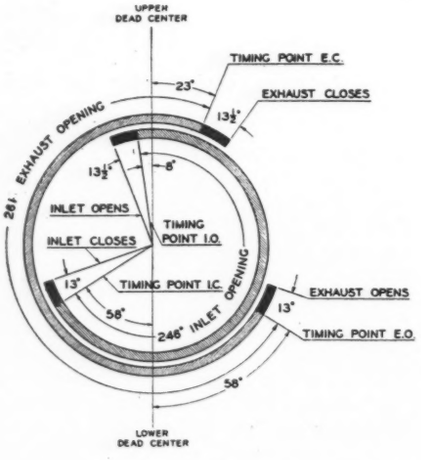
ommendations. Wheels have been balanced, and steering gear properly adjusted.

Any suggestions you have to offer will be greatly appreciated. Missouri Subscriber.

PROVIDED everything is properly adjusted and this condition still exists, you might increase the caster angle by one-half a degree. I have known cases in which this corrected the trouble without other work. Be sure that there is no play in all the steering connections, and that the tire pressures are exactly equal in each front tire. End play in the steering worm should be carefully checked, and the steering gear adjusted so that there is no lash in the straight ahead position.

Timing Buick 36-40

Please give me information on timing a 1936 Buick Straight 8 Model Special 40. I don't seem to be able to advance or retard the distributor without moving the octane selector. In other words, how can I change timing and still set this selector at zero. This car also gives very poor gas mileage. S. E. Sheffer, Sheffer Service Garage, 112 W. 21st St., Baltimore, Md.



TO time the ignition on this engine, the breaker points should open when the ADV mark on the flywheel lines up with the mark on the flywheel housing. If it doesn't, loosen the distributor mounting screws and rotate distributor until the engine is correctly timed. Now, if the octane selector is not on zero, loosen lock-screw on octane selector pointer by means of a 3/16 in. Allen set screw wrench. Then, adjust pointer to the correct position and tighten the lock-screw. If you are using Ethyl gasoline, the distributor can be advanced to the high side of the scale.

Install Later Type Drag Link

We have had a lot of trouble with a 1935 Ford steering. Everything has been checked and adjusted to the best of our ability, and still the steering wheel has a shimmy that we can't get out. The front wheels don't appear to shimmy, but the steering wheel shakes rapidly back and forth about three-quarters of an inch whenever the car is driven over a rough road. Is there anything we can do to eliminate this trouble? A Tennessee Subscriber.

YES, you can correct this condition by installing the 1936 type of steering drag link. The trouble is that the 1935 drag link is not adjustable, and it is difficult to get the steering gear centered on the high point when the front wheels are in a straight ahead position. The 1936 drag link is adjustable, and provides a range within which it is possible to set the wheels straight ahead when the steering gear is centered.

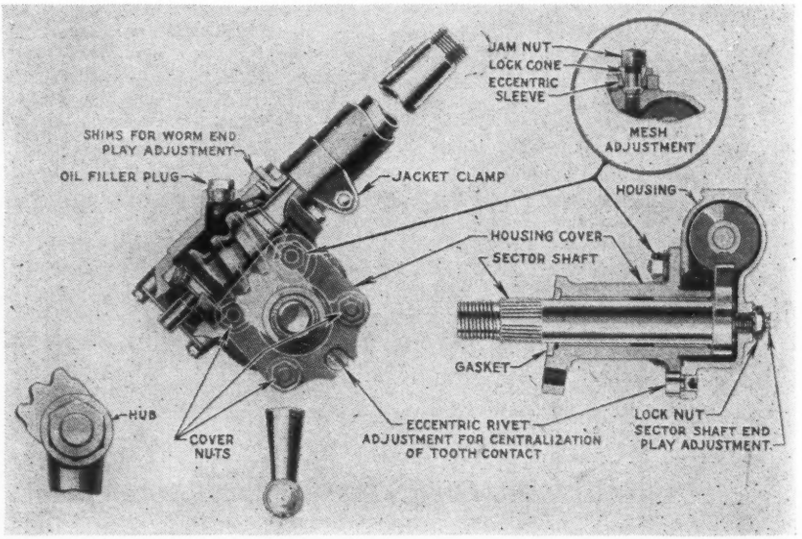
Studebaker Brace Rod

Engine and propeller shaft roughness experienced on a few 1937 Dictators can be overcome by the installation of a support plate brace rod, Part No. 190639. This roughness is experienced between 60 and 65 miles per hour in overdrive. Following the installation of the brace rod, if the roughness continues, loosen the nut at the end of the rod slightly and tighten up the nut on the forward side of the plate. If this does not correct the roughness, reverse the procedure and loosen the nut on the forward side of the plate, tighten the nut on the end of the rod. In the event the roughness continues at the period indicated, it is an indication that the propeller shaft is out of balance and replacement will be necessary. It should be noted, however, that this very rarely occurs and, ordinarily, a proper adjustment of the support plate brace rod will eliminate any difficulty in this respect.

Wants Tune-Up Dope

Would you please send me the valve and ignition timing on all cars manufactured from 1929 up to and including 1937. M. L. Lortz, 3200 S. Western Ave., Chicago.

GLAD to send you a copy of our complete tune-up manual. This has been mailed and if you desire any other dope, be sure and let me know.



How She Shimmies

We have a 1936 Graham that has a low-speed shimmy and we don't seem to be able to eliminate it. The front end has been checked on modern front wheel alignment equipment, and caster, camber, toe-in and king pin inclination all check with factory standards.

Can you tell us what to do to correct this job? An Illinois Subscriber.

THE factory specifications call for 2½ degrees of caster, but if you will increase this to between 3 and 4 degress I believe you will be able to correct this condition.

Of course, you want to be sure that tire pressures are equal, the wheels balanced, shock absorbers working, spring clips tight, and that there is no excessive lost motion in the steering gear. Spring shackles, wheel bearings and tie rod and drag link connections should also be checked and tightened.

Ford Engine Numbers

Ford owners have been caused embarrassment and, in some cases, legal action has been threatened due to the wrong style of engine numbers being used with new or reconditioned engine assemblies where stamped by dealers. Ford recommends that the dealers use the new style figures when stamping engine assemblies. Both the old and new style figures are shown in the illustration.

A 1 2 3 4 5 6 7 8 9 0 ☆ OLD

I8-I 2 3 4 5 6 7 8 9 0 ☆ NEW

Too Much Dust

I have a customer that I have been selling a drum of oil a month for the last two years. He lately installed a Ford V-8 motor on a stand to pull some tumblers in the stove foundry. It has a 20 ft. exhaust pipe and he burns a low grade gas which I think is mixture of gas, kerosene and naphtha. The motor runs 18 hours a day at a speed of 25 m.p.h., six days per week, which equals 2700 miles per week. He drains oil each week. After two months running the crankcase had a great deal of small chunks of carbon in it. Can you give me any information as to what would cause the carbon in the crankcase. He does not have to add any oil. I have been using this oil in automobiles for years and haven't had any trouble. But this is the first time I have sold any for stationary work. The motor has a large radiator and fan on it and runs cool enough. A. M. Webb, 310 Oak St., Louisville, Kentucky.

WHEN you consider that the Ford engine is running the equivalent of 10,000 miles every month, I don't think it is extraordinary to find chunks of carbon in the oil pan. This is the equivalent of a year's driving in passenger car work and I certainly don't think it is any reflection on the oil.

I think the carbon is being formed by dust being drawn into the crankcase through the breather pipe and which is then carbonized when mixed with the oil and strikes a hot surface.

In this connection, I think it would be advisable to install an air cleaner on the breather pipe to overcome this difficulty. If the tumbler is anything like the tumblers I have seen in other foundries, there is plenty of dust in the air which would readily account for the trouble you have described. I think it would also be advisable to install an oil filter so as to maintain the oil in as clean a condition as possible.

Flat Rate on Radiators

Why don't you give the prices for operations C-1 and C-3 for the 1936 DeSoto, in your flat rate manual? A. E. Jones, Durant Ave. Garage, Oakland, Cal.

OPERATION C-1 calls for the removal and replacement of the radiator assembly, while operation C-3 calls for the renewal of the radiator shell, and the reason these operations are not priced on the 1936 DeSoto is that the car does not have the conventional radiator core and shell assembly. However, you will note that we priced operation C-2, Core and tank assembly Renew, and also operation C-3x, Radiator Grille Renew. It is therefore possible to obtain a price for either the core or the grille or both as desired. Incidentally, the same thought applies to many other 1935, 1936 and 1937 cars.

THESE are practical merchandising ideas that have been used by maintenance men — just like yourself. Workable ideas gathered from here, there and everywhere and presented for practical application to your business. Use them and write us your experience for publication herein.

SELLING SERVICE

By Harry T. Cooley

A "Bargain Ad" That Paid

YOUR service advertisement must fairly coax the car owners into your garage.

People can't resist bargains. Yet, the average garageman cannot afford to advertise every day nor will his business thrive on a steady diet of "bargains." However, the Safety Service Garage at Decatur, Ill., used bargains in advertising to start the ball rolling.

When Owner Ted Warren, who also has the Kraft Garage there, decided to open the new place, he looked around for the right kind of manager. He wanted a man who would devote time and thought to building a business. He hired E. E. Hott, who for 12 years operated his own service shop at Davenport, Iowa.

There was no "opening announcement" for the Safety Service Garage when it opened for business the first of January. Instead, there was a nice-sized advertisement in the local papers offering a *$3 motor tune-up job for only 49c!* And, in the ad were itemized the twelve features included in that tune-up:

1. Cleaning and spacing spark plugs.
2. Set timing.
3. Cleaning and setting distributor points.
4. Compression test.
5. Adjusting carburetor.
6. Amperage test.
7. Volt test.
8. Gas mileage analizing.
9. Vacuum test.
10. Check cooling system.
11. Test coil.
12. Test condenser.

The ad brought in 157 automobiles for the 49c motor tune-up, representing a total of $76.93, during the week of the limited offer in spite of cold weather. You may say that wasn't much, that it was a definite loss when the hours expended are calculated. That is true. But, *in the next four weeks, 92 per cent of those cars became repeat business!* Valve jobs, new coil and condenser installations, carburetor jobs and complete motor overhaulings, *averaging $7.73 per car or a total of $1,130.85.*

Besides which, they pushed the sale of batteries to the extent of $31 clear profit, simply by pointing out that there was trouble ahead with the old ones and using mental persuasion. Then, of the first 49c bargains, 106 owners reported back that they got as much as seven miles more to the gallon on their mileage which, any way you figure it, meant a couple of thousand dollars' worth of free word-by-mouth advertising for the Safety Service Garage.

It is to be noted that this is but a six weeks' record of this shop and that the garage is not such a large one. The floor space is about 90 by 56 feet with 25-car storage and a 5-car working area. Further, it is located right in the middle of a flock of garages on Automobile Row.

Now, what has this garage done toward making their service so particularly outstanding as to hold these customers and gain new ones? They are emphasizing a three-point service: Courtesy, Cleanliness and Satisfaction. They are keeping a clean house; there's a welcome on their doormat; they've a "I hope you'll like it, sir!" for the customer as he leaves.

Every night the floor is mopped with soap and water; scrubbed where necessary for the acme of cleanliness. If grease or oil drops on the floor during the work of the day, it is mopped up *immediately.* Customers, coming back to the work area to see how things are coming along, never have to side-step puddles of oil or clots of grease.

It's a fresh uniform for every mechanic each day and even so, they are cautioned about keeping clean and using plenty of waste which is there to use and not to be thrown around. In fact, nothing is thrown around in this shop. Tools have a place and are kept there when not in use. Trash is assigned to cans for that purpose and is *never* kicked or pushed under benches or equipment.

Clean Up On Car Laundry Profits

KLEAN RITE AUTO LAUNDRY, Long Beach, Cal., cleaned up when they installed new car washing equipment. In fact, in 43 days after the installation, this service station had made more than enough to pay for the entire unit from car washing profits. In those first 43 days it had earned $1,600, and the flow of wash business continues to come in.

Ten-Point Sales Program Brings 100% Increase

WITH a systematic ten-point plan, the average monthly sales at the Firestone Service Station, Easton, Pa., has increased more than 100 per cent during the past year, according to R. W. Wilhelm, general manager. The ten points as outlined by Mr. Wilhelm are as follows:

1. Set a sales quota for each employee. Our quotas are on a monthly basis and the amount is determined by the employee's past sales record. Set quotas high enough to make the men put forth real effort, but not so high as to discourage them. Place a quota chart in the office where the men will see it constantly and enter each man's sales every day, drawing a graph line to show each man's daily progress toward his quota. Give prizes to the men whose sales records show the largest percentage of increase over quota.

2. Don't wait for the weekly or bi-weekly meetings of all employes for presentation of sales policies, service

information, etc. Have a five or ten minute talk with some of the men each day. Keep them interested from day to day instead of waiting for mass meetings to revive their interest.

3. Train men to use positive instead of negative selling suggestions. For instance, "I'll check your oil," instead of, "May I check the oil?"

4. Show men how to make a careful survey of each car's needs as it enters the station. The observant employee will make many sales of tires, lubrication, etc., that the less observant man will lose through failure to make proper suggestion.

5. Regular follow-up system on lubrication and brake service. When a car is brought in for brake adjustment and the condition of the lining indicates that replacement should be made within the following six months, a note of this is made on the brake service files and cards are sent to the owner in which we suggest that the brakes be relined. The usual mileage method of follow-up is used on cars lubricated at this station.

6. Employees are not required to carry an assortment of small accessories in their pockets for quick sale to customers at gas pumps. It has been found more satisfactory and easier to increase unit sales by inducing the customer through suggestion to accompany the service man into the store room to see the display. In this manner it is often possible to sell a customer additional items.

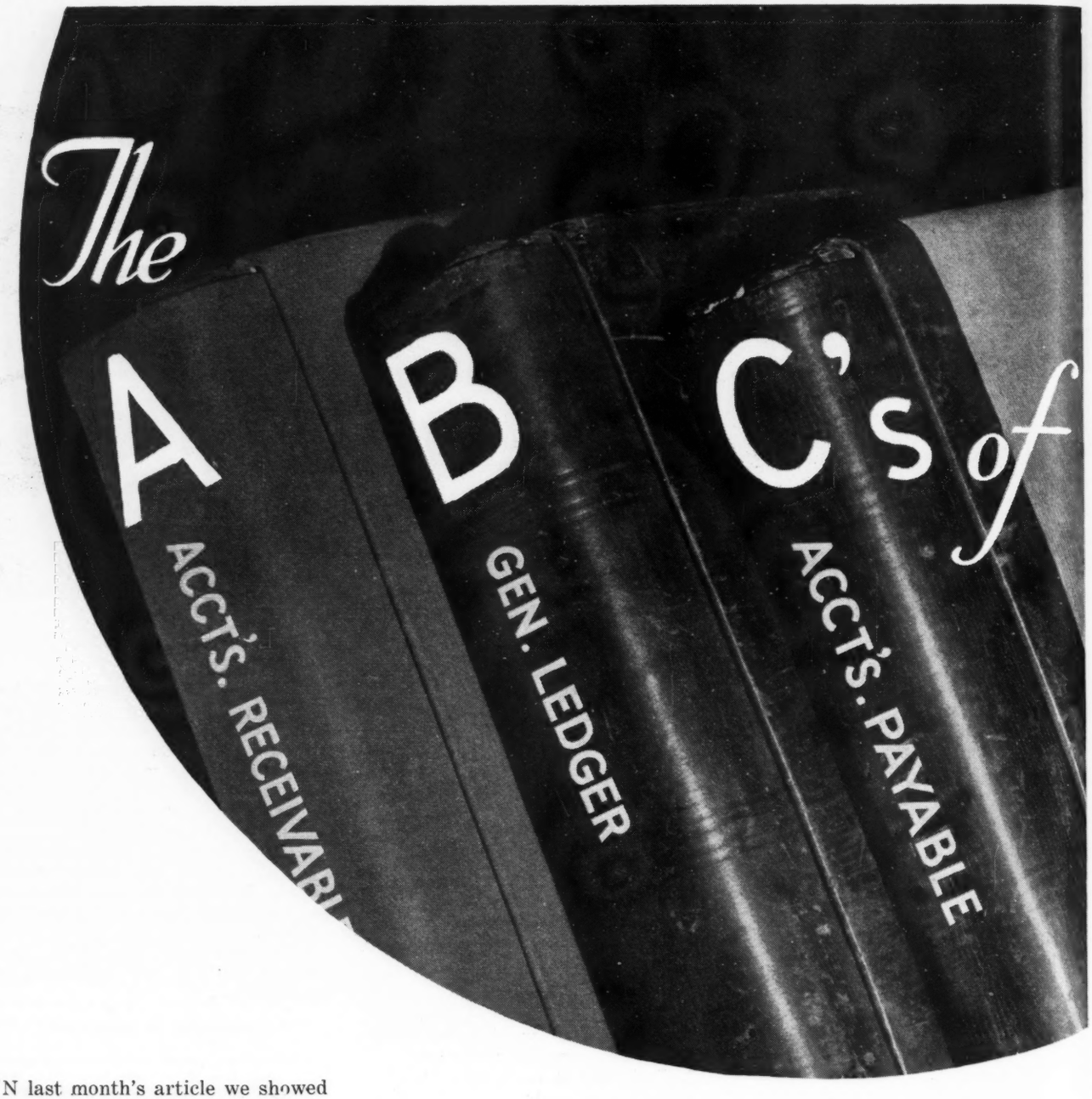
7. Keep the store displays clean and attractive, with all items plainly priced. Spotlight the more expensive and high profit items with prominent displays.

8. Increase sales of quality merchandise with a firm guarantee of satisfaction.

(*Continued on page* 45)

"You Said It."
"WHEN I REPAIR EM THEY'RE AS GOOD AS NEW."
I'm not boasting . . . just stating a fact, that's the result of my specialized training. And I'm one of several mechanics employed by this shop. When your car is left here for repairs or inspection it's sure to come out a better car.
Official Inspection Station
— A. A. A. Service —
PEARL & JENKINS
54th Street Between Westminster & Haverford Ave.
West 1886
Est. 1919
All. 2791

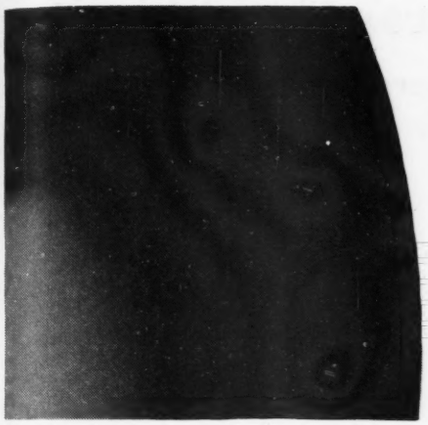
Pearl & Jenkins, Philadelphia garagemen, add a personal touch to their local advertising with a series of ads in which the mechanic who does the job speaks directly to the car owner.



IN last month's article we showed how to close the Cash Book. Your books are now ready for posting into the General Ledger. You will remember, the General Ledger is the one made with a sheet for each account in the Chart.

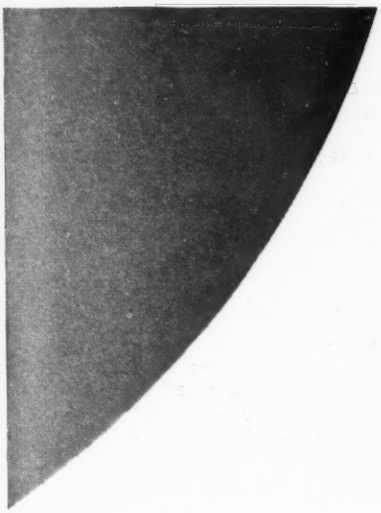
First post the Sales Book. Start with the page headed "Cash Sales." Transfer each of the totals to the corresponding sheets in the General Ledger and enter them on the credit side in each case. For example, the first column is "Gas," and the total may be $578.50. Enter this amount onto the sheet headed "Gas" in the General Ledger and be sure to enter it on the credit side. Proceed in this manner with each column total and then do the same with the next page headed "Charge Sales." Both the Cash and Charge Sales totals are entered on the same sheets in the General Ledger. The column headed "Total" on the Cash Sales does not get entered anywhere, but the column headed "Total" on the Charge Sales is entered on the debit side of the General Ledger sheet headed "Accounts Receivable." This amount is for the total sales charged for the month and must be recorded so.

Posting the Cash Book is next. Transfer or post all totals of column in the Cash Book to the corresponding sheets in the General Ledger. If the column you are posting is headed "credit," that means to enter that total on the credit side of the ledger sheet. The Expense column, which you have already analyzed or separated as to account numbers, is not difficult, as you merely transfer the separate amounts to the corresponding ledger sheets. These entries are all debits. In the case of Accounts Payable, you will note there will always be both debit and credit postings from the Cash Book. As you post all totals from both Cash and Sales Books be sure and make a large check mark ($\surd$) under or above each figure. This will help greatly if you happen to be interrupted during your work, and will



By H. W. HANKINSON

SHOP BOOKKEEPING



This is the final installment describing a simplified system of bookkeeping for the independent repair shops: covering the closing of the books and preparing financial statements

indicate just where you left off.

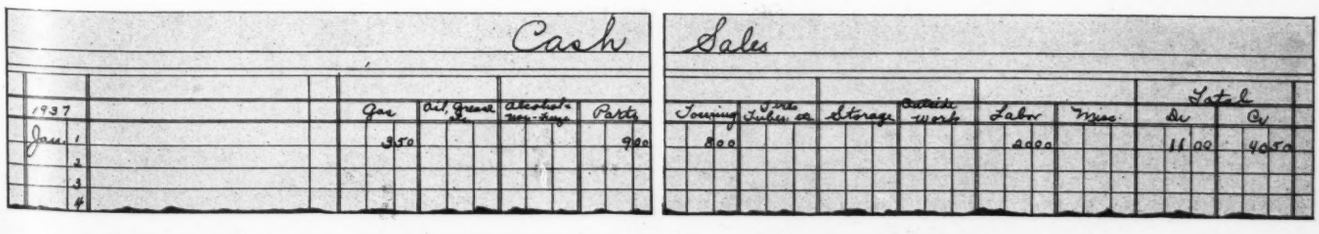
With all entries for the month posted into the General Ledger, you are now ready to take a Trial Balance, which is taken from the General Ledger sheets only. Start with the first sheet and list down on a piece of paper the amounts entered on every sheet on the credit side, then do the same with another list of all entries on the debit side. In the case of where there are entries on both sides, subtract the smallest from the largest and the difference will be (in the case of the debit being the largest) a debit balance and added to your list of debits. If the credit side is the largest, the difference will be a credit balance and so listed. Add the two lists and the results should be the same. The debits should be the same total as the credits. This means that so far the books are in balance.

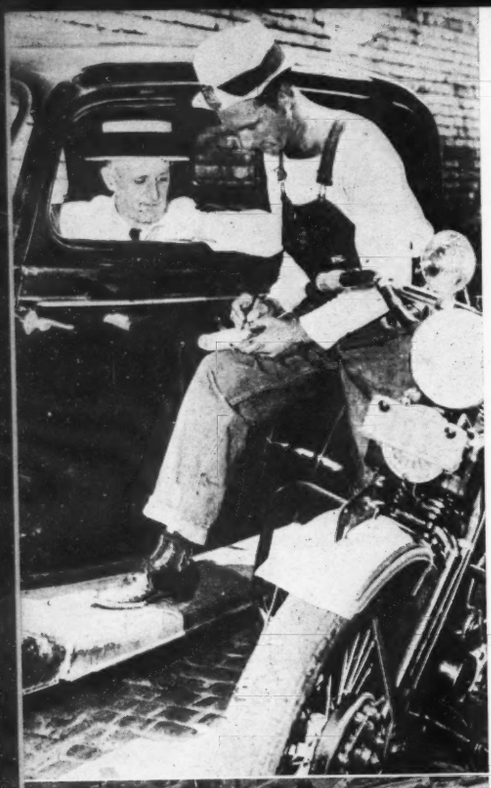
To prove further, all control accounts should be added. This means that any account that is backed up by a detail list, namely the Accounts Receivable, Accounts Payable, and Cash.

The Accounts Receivable figure in the General Ledger is proved by listing all the separate accounts in the Accounts Receivable Ledger, and the total should agree with the balance on the General Ledger sheet. Of course, we assume that the Accounts Payable Ledger has been made, which is similar to the Accounts Receivable, but each must have a separate alphabetical index, and postings to these sheets come from the daily entries during the month from the columns headed Accounts Receivable and Accounts Payable.

Proving the cash balance should be done by obtaining a bank state-

(Continued on page 46)





Indianapolis Drops Fuel Limit

Speedway to Adopt New International Racing Formula; Foreign Competition Invited for '38 Contest

International competition will be invited in the race at the Indianapolis Motor Speedway next May 30 by the removal of all restrictions which in the past several years have appeared to mitigate against foreign cars.

Capt. E. V. Rickenbacker, president of the Speedway, announced that the new international racing formula will be adopted in its entirety and that all restrictions on fuel would be dropped. Also for the first time in years it will not be necessary to carry riding mechanics.

The new rules permit superchargers on motors within the limits of 183 cu. in. piston displacement and the maximum limit on all engines will be 274 cu. in. without superchargers.

In the interest of motor car development, the first fuel restriction was placed on cars at Indianapolis in 1934 when the racers were allowed but 45 gal. of fuel to complete the 500-mile contest. In 1935 the amount of fuel was further reduced to 42½ gal., and another reduction to 37½ was ordered in 1936.

Last year the limit on the amount of gasoline used was lifted but cars were restricted to the use of stock fuel rather than the special mixtures formerly used. Foreign cars are so constructed that it is almost impossible for them to obtain their maximum efficiency with stock gasoline and cars from across the sea passed up the speedway classic because of this restriction.

Indianapolis returned to two-man cars in 1930 after several years of racing with one man jobs and a riding mechanic has been mandatory ever since. Foreign cars are single seaters, but may not be less than 33.46 in. wide, and the breaking down of this other rule will encourage them to try for the $100,000 in prize money.

All-American Soap Box Derby

On Sunday, Aug. 15, speed demons in their lesser 'teens and in their less than 'teens will steer their home-made racing chariots to fame and prizes in the 1937 All-American Soap Box Derby, the annual coasting race for boys sponsored by Chevrolet, in which more than 120 boys from 9 to 15 years old, from all over the United States and from foreign countries as distant as South Africa, will take part.

The boys won the right to compete by triumphing in local elimination contests sponsored by more than 100 newspapers in cooperation with Chevrolet. About 200,000 boys participated in these trials, which were witnessed by some 3,000,000 spectators. In each of the local elimination contests, there were identical rules of competition. Each coaster racing car was built by the driver and cost no more than $10 to make. The winners of these races, in addition to getting immediate awards, earned the right to go to Akron for the national and international finals, with all expenses paid.

Prizes for the winners of the finals include a four-year university scholarship, two new Chevrolet cars, wrist watches and silver trophies offered by Chevrolet.

Down the Column:

Motorcycle Cops in Atlanta were recently ordered to wear civilian clothes, during a drive on speeders. The "farmer" above is handing a ticket to an unsuspecting motorist.

Traffic Maze Autos crowd the highways as New York celebrates the Fourth. This Airview shows cars on New Long Island parkways, and it takes a lot of maintenance to keep them running.

Antiques Run in pageant-parade of transportation as Philadelphia celebrates the 150th anniversary of the adoption of the Constitution. Photo shows some of the "Hossless" carriages which participated.

Pinned Under Car The driver had to be pried out with a crow bar after this car crashed through a fence during a recent race near Atlanta. Result: a broken leg and a badly wrecked car.

Knudsen Reiterates GM Stand

Tells Union That Company Must Be Assured Against Unauthorized Strikes

General Motors Corp. informed the United Automobile Workers, in a letter dated July 20 from William S. Knudsen, president of GM, to Homer Martin, president of the UAW, that the company is standing its ground on the matter of requiring specific assurance against unauthorized strikes before the company will negotiate any other changes in its contract.

Mr. Knudsen's letter was in answer to one from Mr. Martin which claimed that in order to successfully prevent such strikes, it would be necessary to eliminate their cause. Mr. Martin said the union is doing all it can to prevent "wildcat" strikes and will intensify its efforts, but stated that a faulty grievance procedure was the reason for the strikes. He asked a revision of the practice in this respect.

Mr. Knudsen declared in his answering letter that in no case had the union exhausted the grievance procedure set up and that in many cases, strikes were called before the management was aware that grievances had arisen. He also said that the shop committee arrangement provided had worked well, answering Mr. Martin's complaint that a shop steward system was needed, Mr. Knudsen repeated the form of a stipulation covering the matter of responsibility for unauthorized strikes as originally suggested in his statement to the union on June 23.

Leaded Gasoline Gains

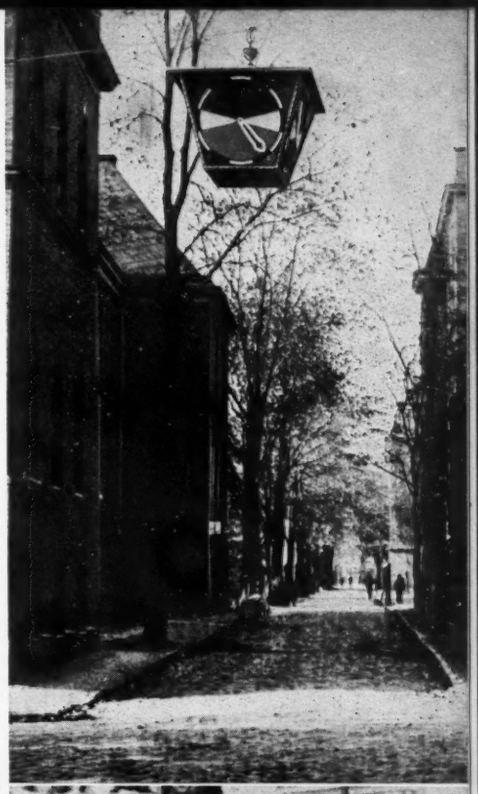
A steady rise in the percentage of leaded antiknock gasoline used by American motorists, with a corresponding drop in the consumption of unleaded regular and third-grade fuels, is reported in a nation-wide survey of gasoline sales by the Ethyl Gasoline Corporation. A parallel trend in compression ratios of automobile engines is noted, indicating that motor car owners are turning more and more to antiknock fuel as engine efficiencies increase.

Sales of Ethyl or premium gasoline with an antiknock rating of seventy-six octane or higher climbed from 558,900,000 gals. in 1934, to 622,700,000 gals. in 1935; and to 783,300,000 gals. in 1936. Engine compression ratio averages for the same years were 5.72, 5.99, 6.19, respectively.

Leaded regular gasoline, rated at seventy octane, increased in gallonage from 10,139,600,000 to 12,580,500,000, while total consumption of unleaded fuel of both the regular and the third-grade variety showed a percentage decline of 4 per cent in the same three-year period. Actual gallonage in all classifications increased, however, as total consumption for the country was registered at 16,683,100,000; 17,742,200,000; and 19,622,200,000 gallons for each of the three years.

$2,000,000 Equipment "On Time"

In the brief year since National Standard Parts Assoc. approved and sponsored the Uniform Time Payment Plan covering equipment sales, over $2,000,000.00 worth of equipment has been sold by the 800 jobbers and 50 manufacturers using the plan, according to Commercial Credit Company of Baltimore.



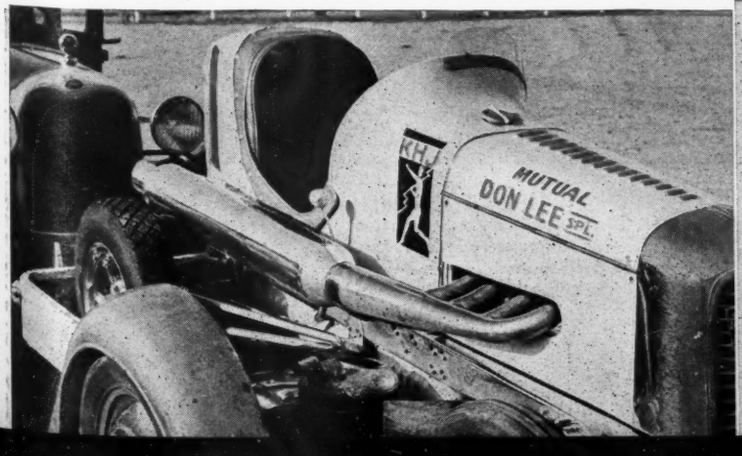
Down the Column:

Clock Regulates Berlin Traffic The clock face is divided into four sections, two larger parts for red and green and two smaller parts for yellow. A hand runs over the colored fields and regulates traffic.

Death in Manhole Photo shows a sprayer on a motorcycle spraying a manhole during a campaign to exterminate mosquitoes in the towns of the Des Plaines River Valley.

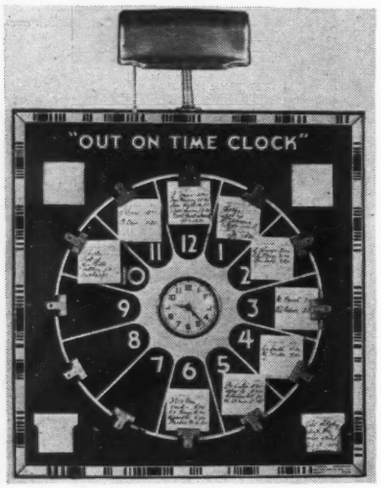
Track Meet Drivers at Brooklands must sprint from the paddock to their cars, leaping obstacles on the way. After a few laps the driver passes a baton to his co-driver who takes his place in the relay.

Muffling The Midgets Neighbors in search of peace and quiet were responsible for midget mufflers in Los Angeles. Motors got hot, and so did drivers trying to keep the mites cool as well as muffled.



Out-on-Time Clock Service Follow-Up

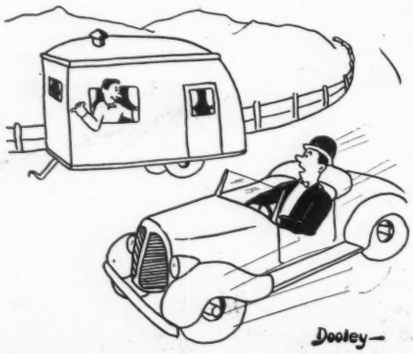
A visible reminder to the service manager, and an aid in planning his jobs through the shop on time, has been developed by the Houser Engineering & Mfg. Co., 123 N. Main St., Bluffton, Ind. It consists of an electric clock with a special face, to which



are attached clips for holding job orders. The clips are arranged opposite the numerals of the clock, so that the job order can be attached to the clip opposite the time at which the completed job was promised. In the upper corners of the special face, space is provided for inserting the insignia of the car line represented by the dealer, and the lower corners have pockets for holding special notes written during the day. The Out On Time clock is supplied with or without the overhead electric light. For complete information and prices, write the manufacturer.

Canton Get-Together

Well over a thousand repair men attended the annual Get-Together meeting of Wolff's Auto Parts Co., Canton, Ohio, recently. In addition to the regular yearly event, this year marked the Tenth Anniversary celebration in the merchandising show which Joe Wolff put on every year for the trade. Main event of the evening was the showing of the Thompson picture, "Drama of Motordom" with Tom Duggan of Thompson Products as master of ceremonies.



Studebaker Offers Diesel Truck

C. H. Wondries, director of Sales Truck Div. of the Studebaker Corp., has announced the introduction of a special Studebaker Diesel-powered truck known as model J20D. The chassis is designed for 9, 12, and 15-ft. bodies with 138, 162, and 180-in. wheelbase dimensions. Prices at the factory are listed as $2,450, $2,500, and $2,550, respectively.

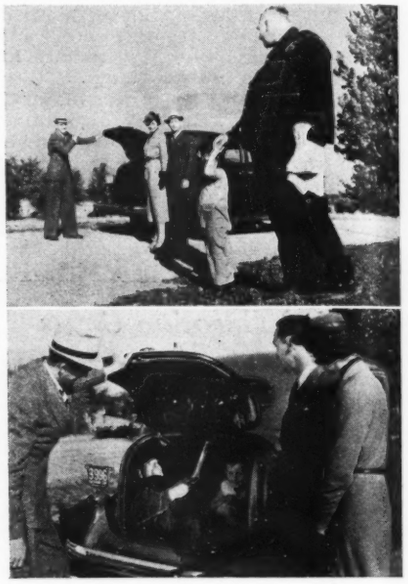
The new truck is powered by a six-cylinder Hercules engine, model DJXB, with bore and stroke dimensions of 3½ in. by 4½ in., giving a piston displacement of 260 cu. in. Torque rating is 174 lb.-ft. at 1200 r.p.m. Gross vehicle rating of the J20D is 15,000 lb., 1000 lb. greater than the model J20 gasoline powered truck of two to three ton rating.

Judges Selected For Sensational Permite Contest

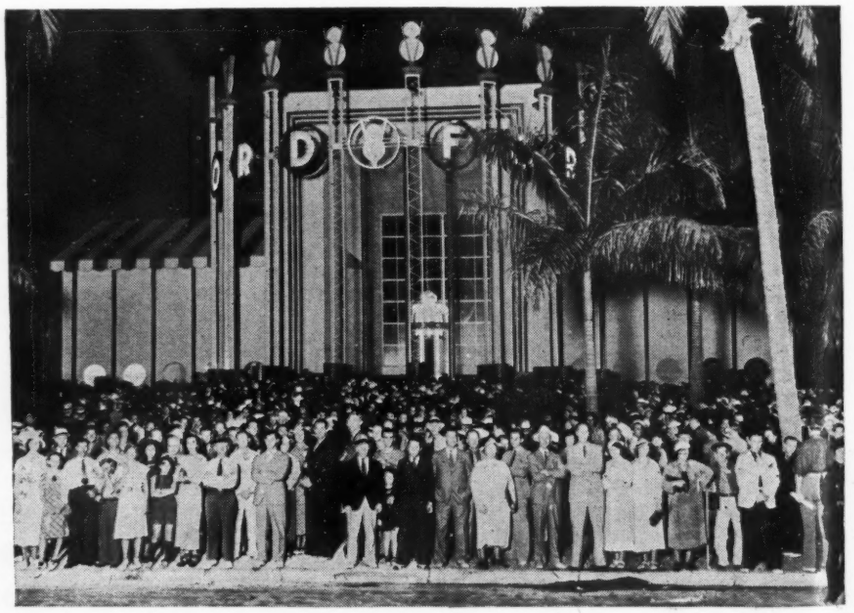
A. H. Packer, Editor *Motor Service Magazine*; A. L. Dyke, Editor *Dyke's Automobile Engine Encyclopedia*, and R. F. Kuns, Principal *Cincinnati Automotive Vocational High School*, are the three prominent men selected to judge the entries in the Permite Replacement Parts Contest sent in by automotive repairmen from all parts of the U. S. and Canada.

Contestants must write about 15 words to complete the sentence, *"I Like Permite Replacements Parts because . . ."*

As this contest is open only to automobile repairmen and mechanics in the U. S. and Canada, trained letter writers, school teachers and literary experts are automatically ruled out. Every automotive mechanic and repairman has the same equal chance to win one of the 6,443 Valuable Prizes and Gift Awards, which include a Ford, Chevrolet or Plymouth DeLuxe 2-door Sedan and 199 cash prizes ranging from $100 down.



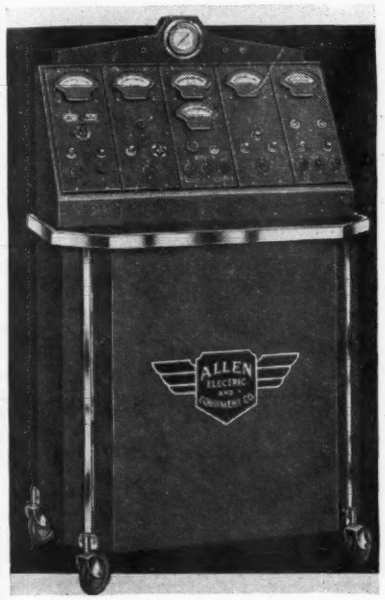
PROVING Ground Stunt. Andy, 350 pound caretaker of the Studebaker 800-acre Proving Grounds, was coaxed to climb into a 1937 Studebaker luggage compartment, and bring his young son along. Well, they both made it as shown in the lower photo.



Ford Friends **One hundred and eighty-five thousand persons visited the Ford Florida Exposition in Miami during the first 20 days after its opening, it was announced last month. The exposition embraces displays of Ford V-8, Lincoln and Lincoln-Zephyr cars and Ford trucks. Also exhibits of southern materials which are used in the manufacture of Ford products.**

Allen Announces New Tester Series

The Allen Electric and Equipment Co., 2101 North Pitcher St., Kalamazoo, Mich., has announced their "E-200" series of motor testers. Each unit is complete in itself, and can be used separately, or they all may be



assembled in a cabinet panel. The several units consist of a distributor contact angle tester, voltmeter and ammeter testers, coil tester, condenser tester, spark plug tester, vacuum-compression tester, and a combustion analyzer. Complete operating instructions are supplied, and an Allen factory representative will personally train the purchaser in the use of the tester.

Safety for the New Driver

The establishment by cities of specially laid out and equipped sites for training automobile drivers is the basis of a plan for reducing the number of highway accidents which has been developed by W. Hamilton Owens and approved by the Health Guild of America, of which Dr. J. F. Montague of New York is president. The assumption from which the plan grows is that inexpert drivers are a serious menace and that by requiring all drivers, before licenses are issued, to go through a course of training on one of these sites, learners and beginners would be removed from the city streets and public roads.

The sites selected would be easily accessible. Each would be about 1,000 feet square and would be laid out with streets providing all known traffic hazards. There would be one-way streets, dead-end streets, traffic circles, railroad crossings, etc. There would be traffic lights, police patrol cars and policemen as instructors.

Physical tests would be given all applicants in an administration building, a part of the layout, and no applicant would be allowed to take an examination for a license until a certain degree of proficiency had been demonstrated after a course of instruction.

Dallas 300-Mile Race Cancelled

The Pan American 300-Mile Auto Race Classic scheduled to be run at Dallas on August 1st has been cancelled by agreement reached on July 10th between the Contest Board and the Directors of the Greater Texas & Pan American Exposition. This action followed the announced refusal of a group of prominent drivers to enter the event unless the distance was drastically reduced. Exposition officials, while willing to approve a reduction to 250 miles, felt that the expenditure involved, (i.e., $17,500 prize money, plus from $10,000 to $15,000 construction and organization costs) warranted a race of major character and that a race of 200 miles (as specified by the drivers' request) failed to meet the desired requirements or to justify the proposed expenditure.

Automobile Racing Schedule—1937

Date	Place	Type	Promoter
Aug. 7th	Lewistown (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Aug. 8th	Hohokus (N. J.) Speedway	Sprints	Jimmy Johnstone
Aug. 15th	Cook County (Chicago) Fairgrounds*	Sprints	Carl Stockholm
Aug. 21st	Middletown (N. Y.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Aug. 21st	Springfield (Ill.) Fairgrounds**	Sprints	Hankinson Spdwys., Inc.
Aug. 22nd	Milwaukee (Wisc.) Fairgrounds**	Sprints	Hankinson Spdwys., Inc.
Aug. 26th	Milwaukee (Wisc.) Fairgrounds**	Sprints	Hankinson Spdwys., Inc.
Aug. 27th	Altamont (N. Y.) Fairgrounds*	Sprints	Albany-Schenectady Fr.
Aug. 28th	Altamont (N. Y.) Fairgrounds*	Sprints	Albany-Schenectady Fr.
Aug. 29th	Milwaukee (Wisc.) Fairgrounds**	Sprints	Hankinson Spdwys., Inc.
Sept. 4th	Flemington (N. J.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 4th	Bedford (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 6th	Flemington (N. J.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 6th	Hohokus (N. J.) Speedway	Sprints	Jimmy Johnstone
Sept. 10th	Cedar Rapids (Iowa) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 11th	Rutland (Vt.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 11th	NEW YORK STATE FAIR**	100-MILE	NATL. IRA VAIL
	SYRACUSE	CHAMPIONSHIP	
Sept. 10th	Pottsville (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 11th	Pottsville (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 12th	Pottsville (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 17th	Brockton (Mass.) Fairgrounds*	Sprints	Ira Vail
Sept. 18th	Brockton (Mass.) Fairgrounds*	Sprints	Ira Vail
Sept. 18th	Hamburg (Mass.) Fairgrounds*	Sprints	Ira Vail
Sept. 19th	Reading (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 19th	Cook County (Chicago) Fairgrounds*	Sprints	Carl Stockholm
Sept. 25th	Nashville (Tenn) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 25th	Allentown (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Sept. 26th	Hohokus (N. J.) Speedway	Sprints	Jimmy Johnstone
Oct. 2nd	Richmond (Va.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 2nd	Trenton (N. J.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 2nd	Shelby (N. C.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 2nd	Bloomsburg (Pa.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 2nd	Mineola (N. Y.) Fairgrounds*	Sprints	Ira Vail
Oct. 9th	Wilson (N. C.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 9th	Danbury (Conn.) Fairgrounds*	Sprints	Ira Vail
Oct. 16th	Spartanburg (S. C.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 16th	Raleigh (N. C.) Fairgrounds*	Sprints	Hankinson Spdwys., Inc.
Oct. 17th	Hohokus (N. J.) Speedway	Sprints	Jimmy Johnstone

*—County Fair. **—State Fair.

Cancel Sept. Race At Roosevelt Track

The following statement has been issued by the management of the Roosevelt Raceway announcing cancellation of the Pan American Race, originally scheduled to be run on Sept. 6, 1937:

"With American racing stars planning new and faster cars for the third George Vanderbilt Cup Race at Roosevelt Raceway next July Fourth, the management of the Raceway has decided not to hold another race this year, but to wait until the Yanks were in a better position to meet a foreign invasion.

"Plans for a Pan American race, tentatively scheduled for Labor Day, therefore, have been abandoned.

"In the meantime Roosevelt Raceway will be offered to American motor builders, car owners and race drivers as an outdoor laboratory in which to develop racing jobs capable of bringing the Vanderbilt Cup back to America next Fourth of July."

No Smiles to the Gallon

"Fillerup?"

"Fillerup."

"Checker erl?"

"Erl's okay—but listen. You charge batteries?"

"Yeh, we charge batteries."

"How much?"

"Much as they need."

"Yeh, but what do you charge?"

"Why, ah, batteries."

"Naw, listen. I mean, how much does it cost you?"

"Doesn't cost us anything; we got our own equipment and we charge for it."

"Yeh, but how much would it cost me?"

"Well—you got your own equipment?"

"Equipment?"

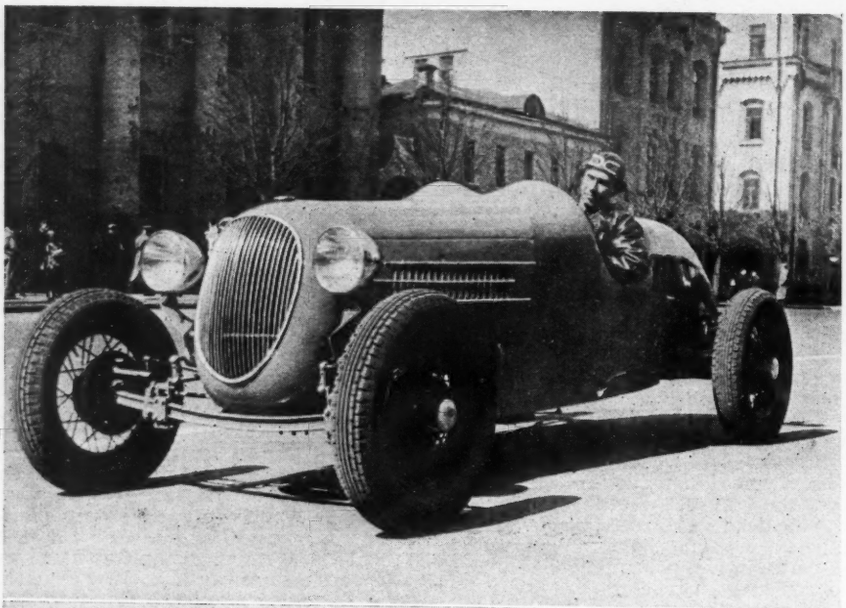
"Sure. You going into the business you gotta have equipment."

"But I'm not going into the—. Listen, I want to know if you charge batteries, and if you do charge batteries, how much you charge for charging batteries, and if you'd charge my battery and charge to my account what you charge for charging—aw, skip it! Fillerup and lemme get outta here!"

MICHAEL KANE, in *Exide News*.

Plan Palatial Trailer Park

Plans are being discussed for a trailer camp near the intersection of the Boston Post Road and the Hutchinson River Parkway, just north of New York City and within easy reach of the site of the New York World's Fair of 1939, it was announced by Bronx Borough President J. J. Lyons.



Vodka Wagon Soviet is building racing cars and will hold several cross-country races this summer to arouse public interest in automobiling. Note the Ford axle.

Machine Age Monster Marge Blaine, pirate girl of the 1939 Golden Gate Exposition; J. M. Noble, manager of the Automotive Maintenance show, and G. H. Mosel, automotive engineer, appear with "Anipopodisorius" which was on display during the recent National Automotive Wholesaler's Convention in San Francisco.

Dutch Cleansers Cleaning up for bigger and better battery business. During the recent Tulip Festival in Holland Mich., the front of the Holland Battery Station was cleaned with Dutch thoroughness by these young women in Dutch costume.

Form Racing Corp.

Bowes Racing, Inc., Will Build Car To Meet Foreign Competition

Announcement has been made of the formation of Bowes Racing, Inc., a new corporation with the sole purpose of building a racing vehicle capable of competing on an even basis with the German and Italian cars which have dominated the Vanderbilt Cup races for the past two years. "Lou" Meyer of Huntington Park, Calif., and Robert M. Bowes, president of the Bowes Seal Fast Corp. of Indianapolis, form the personnel of the new organization.

Meyer will have complete charge of building the proposed speedster and has already departed for Los Angeles to get construction work under way. The new car will cost more than $15,000 and will be built to comply with the new international racing rules which will go into effect in this country next year.

According to present plans, the body of the car will incorporate latest principles of streamlining to cut down wind resistance and add to the car's speed possibilities. Many imported parts will be required for the engine, including a foreign-built supercharger.

P & D Completes Expansion Plans

To the present modern factory now occupied by P & D Mfg. Co., Inc., in Astoria, L. I., will be added 40,000 square feet of floor space. "When we erected this building" said Mr. Piffath, president of the company, "we thought we were fixed for a long time. But the tremendous acceptance of our products has made it necessary to again enlarge.

Our new addition will make for the utmost efficiency as well as the last word in comfort and convenience for our employes.

Bantam Ready

R. S. Evans, president of American Bantam Car Co., Pittsburgh, has reported that of 90,000 shares of stock which were originally offered in the new company, 85,000 shares have been sold and the remaining 5000 shares withdrawn from the market.

Mr. Evans stated that the company is now fully financed for production, has assets in excess of $1,500,000, of which one-third is in cash; and is free of all indebtedness except current liabilities of less than $15,000.

"During the past six months, while the company was being financed," said Mr. Evans, "engineering and designing for the new line of trucks and passenger cars was completed, commitments made and orders placed for materials. Production is scheduled for September."

Initial production of the American Bantam Car Co. will consist of quarter-ton chassis, panel and pick-up trucks, coupes and roadsters.

The American Bantam Car Co. purchased the properties of the former Austin Car Co. last summer. The plant was originally equipped in 1930 and has a capacity of 40,000 cars a year.

dag

When Edward G. Acheson developed a means of making a pure graphite, he brought much nearer the practical use of this solid lubricant for automotive lubrication. This material, being in the powdered form, however, still did not lend itself to suspension in oil. ❖ Acheson knew that he had a material that was ideal as a supplement to oil; that could "take the strain" during severe operating conditions.

Further research followed and colloidal graphite was developed. The Acheson Process of colloidalizing breaks tiny particles of graphite into particles hundreds of times finer. These particles are estimated to measure approximately 1 two hundred thousandth of an inch in diameter.

Since the year 1906, the uses of "dag" colloidal graphite have expanded into many different applications, and vary all the way from a lubricant for heavy duty machinery to a lubricant for drawing wire 4 ten thousandths of an inch in diameter.

Ask your oil supplier about his colloidal graphited lubricants today

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

REG U.S. **dag** PAT OFF.
COLLOIDAL PRODUCTS

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COLLOIDAL GRAPHITE

"DAG" COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

Flat Rate Prices On 1937 Ford

Model 74—60 Hp.—V8—1937

Starting Serial Number: 54-6602

2.6 in. bore x 3.2 in. stroke. Piston Dis. 136 cu. in. A.M.A. Hp. 21.6

OPR.	LAB.	MAT.	MFR HR.
A			
1	$6.50	$ .60	2.5
2	9.00	.60	N.O.
3	2.50	....	N.O.
5	5.70	2.60	2.7
6	1.75	2.00	.7
7	7.00	R 5.00	3.3
7x	2.40	8.45	1.0
7y	See A7x		
8	5.50	....	2.0
8x	2.50	....	2.8
8y	8.00	....	4.0
9	2.25	R 2.40	1.0
9x	.90	....	.7
10	R 1.25	1.20	.5
11	4.50	....	N.O.
12	3.15	....	1.6
13	1.35	....	N.O.
14	7.50	....	3.3
15	R 2.50	.10	N.O.
16	R 1.50	....	.5
18	R 1.80	....	N.O.
B			
1	5.80	1.50	N.O.
3	1.15	....	N.O.
4	4.00	.20	1.3
8a	.90	.95	N.O.
8b	1.70	.90	N.O.
8c	1.85	.95	N.O.
8f	5.20	R 2.05	N.O.
10	5.50	R 2.05	N.O.
13	8.75	R 4.10	N.O.
13a	1.25	....	N.O.
13y	17.25	....	4.4
14	1.50	.40	N.O.
16	1.00	....	N.O.
17x	1.50	.75	1.2
C			
1	4.00	....	N.O.
2	2.00	16.00	N.O.
3x	5.00	14.10	N.O.
4x	.60	1.25	.5
5	.40	....	.3
6	.75	....	.3
7x	1.50	....	1.0
8	1.00	.70	.5
10x	.40	1.30	N.O.
11	1.80	.15	1.0
12	2.70	....	1.2

OPR.	LAB.	MAT.	MFR HR.
D			
2x	R $2.00	$ .10	1.0
3	3.25	.60	2.0
4	.80	.05	N.O.
6	.60	.05	.5
7	2.35	.30	.9
7x	4.35	....	N.O.
7y	2.40	9.45	1.0
8	.40	....	N.O.
9	3.00	....	1.3
10	1.25	....	.5
11	.50	.05	N.O.
11x	1.75	....	N.O.
12	2.50	2.70	1.0
13	1.60	1.10	N.O.
15	1.80	....	1.0
16	1.50	....	N.O.
E			
1	96.50	....	N.O.
1a	3.50	....	N.O.
2	65.40	....	21.5
3x	31.50	13.85	13.5
4	29.70	11.90	12.8
5	27.50	11.65	12.5
F			
1	9.50	1.00	N.O.
3	63.30	R 51.95	11.0
H5	12.70	2.50	N.O.
5	14.30	2.50	N.O.
5x	16.30	2.80	N.O.
5y	22.00	3.30	N.O.
6	R 3.65	.15	1.3
9	2.25	.50	N.O.
10	2.20	.45	.8
11	4.15	.90	2.7
13	R 5.00	1.60	3.5
15	7.40	....	N.O.
15a	2.40	....	N.O.
15b	1.50	....	N.O.
17a	4.00	....	N.O.
18	3.00	.30	N.O.
19	R 1.90	.35	N.O.
G			
2	1.80	1.95	N.O.
2a	.25	.25	N.O.
3	16.50	4.45	5.7
5	18.70	4.70	6.3
6	20.50	6.65	10.0
7	.50	.30	N.O.
9	4.00	2.20	N.O.

OPR.	LAB.	MAT.	MFR HR.
G—contd.			
10a	$8.70	$4.50	4.3
11	13.35	5.30	N.O.
13	4.90	3.25	N.O.
14	40.50	25.90	N.O.
H			
1	12.70	2.50	N.O.
1x	7.70	2.05	N.O.
1a	5.50	1.60	N.O.
1b	2.70	.45	N.O.
2	2.00	....	N.O.
2a	.25	....	N.O.
5	5.90	2.40	N.O.
5x	.90	.80	N.O.
6	2.00	6.40	N.O.
K			
1	4.50	2.60	N.O.
3	5.70	9.00	N.O.
5	2.00	9.00	N.O.
6	9.00	4.20	3.8
8	19.00	30.45	5.0
L			
1	14.75	1.50	8.3
1a	11.00	.60	6.8
2	11.75	1.50	N.O.
3	N.C.	4.80	N.O.
4	N.C.	.30	N.O.
7	4.40	.85	1.8
7a	R .75	.10	N.O.
11	2.00	.30	N.O.
M			
1	5.75	.50	3.0
3	R 8.50	.80	N.O.
4	R 8.50	5.80	N.O.
4a	R 3.00	5.30	N.O.
4b	R 5.00	5.45	N.O.
6	R 11.00	7.75	N.O.
7	3.50	.30	N.O.
O			
1	.50	....	.5
3	7.00	4.00	4.1
4	6.00	1.60	4.1
5	7.30	....	N.O.
6	.30	....	N.O.
7	.75	1.05	N.O.
8	9.30	....	N.O.
9	8.10	....	N.O.
11	R 13.25	8.25	N.O.
12	R 6.25	7.90	N.O.

OPR.	LAB.	MAT.	MFR HR.
O—contd.			
13	$1.25	$ .80	.7
14	R 14.50	2.60	9.2
18	1.60	....	.8
P			
1	5.50	.25	N.O.
1x	7.25	.90	N.O.
2	1.75	.65	N.O.
3	10.00	....	6.1
4	2.10	....	1.1
5	7.25	7.90	N.O.
6	4.50	....	N.O.
7	1.80	2.00	N.O.
Q			
3	R 4.50	2.75	1.2
6	7.00	8.10	2.8
R			
1	R 4.00	.35	3.5
2	R 4.00	12.00	2.5
4	See R4b		
4b	7.00	3.85	2.8
5	R 10.90	....	5.5
6a	6.20	3.80	N.O.
9	11.50	13.10	N.O.
S			
1	.75	....	N.O.
3	R 1.00	....	N.O.
4	6.50	....	5.0
5	3.50	.15	2.2
6	5.00	.15	2.3
7	3.00	5.20	1.5
7x	3.00	....	N.O.
8	4.50	5.95	2.0
8x	3.50	....	N.O.
9	1.50	....	.7
10	1.50	....	.7
11	R 1.00	....	N.O.
12	R 1.00	....	N.O.
T			
3	6.30	11.85	2.8
4	6.30	.90	N.O.
U			
1	1.00	....	N.O.
2	2.40	....	.7
3	2.65	....	N.O.
4	1.90	....	.7
6	.40	....	N.O.
6x	1.10	4.50	.5
7	4.40	....	N.O.
7a	2.25	....	N.O.

OPR.	LAB.	MAT.	MFR HR.
U—contd.			
7x	$ .65	$ .35	N.O.
9	2.00	.20	1.0
10	2.50	.50	N.O.
11	3.00	1.50	1.0
12	1.20	....	.7
12a	3.00	1.10	1.8
12b	1.25	1.15	N.O.
13	1.70	....	N.O.
13a	3.20	....	1.2
13b	1.50	1.10	N.O.
14	2.90	R 4.10	N.O.
15	.75	....	N.O.
15x	2.20	4.25	.8
15z	2.05	....	.8
16a	.90	1.30	N.O.
17	R .40	....	N.O.
17x	.90	2.20	.3
18	2.90	....	1.0
19	2.00	....	.7
20	1.25	.20	.7
21	.40	.50	.5
22	.50	....	N.O.
23	.90	....	.5
24	.90	.35	.5
25	1.00	....	N.O.
V			
1	4.00	11.75	2.0
3	3.00	6.25	1.5
5	2.50	5.75	1.3
7	R 9.00	....	N.O.
W			
1	.45	....	.8
2	.30	.10	.6
2x	.25	....	N.O.
3	.90	....	.7
4	1.80	2.45	.6
4x	1.50	1.35	.9
5	1.00	.35	N.O.
6	.25	....	N.O.
7	.55	7.40	.6
8	1.20	7.60	.9
X			
1	1.25	....	.5
2	18.00	....	N.O.
4	1.80	....	1.0
5	2.40	....	1.3
6	2.70	....	1.5
6x	.90	....	.5
9	.90	....	.5
10	36.00	34.00	20.0

N.O. = No Factory Operation. N.C. = No Charge.

Factory hours from Ford labor Schedule September, 1936

R IMPORTANT—Read below before quoting prices

R A7, 9—Material price includes tie rod end assemblies.

R A10—Applies to drag link end assembly.

R A15, 16—If necessary to unbolt steering at frame add $2.50 labor.

R A18—Puller must be used to remove pitman arm.

R B8f, 10, 13—Material price applies to brake assembly exchange.

R D2x—Applies to exhaust gaskets only.

R F3—Material price includes block assembled with pistons, pins and rings.

R F6—Valve adjustment not included.

R F13—To R & R oil pan remove tie rod, exhaust cross pipe, both lower radiator hoses and front engine support bolts. Disconnect radius rod at rear mounting and spring down. Raise front of engine 2 inches by placing blocks under engine support on each side.

R F19—Includes R & R inlet manifold.

R L7a—When in same block. If necessary to remove other head add $1.50 labor.

R M3, 4, 4a, 4b, 6—Manufacturer does not sell cam gear separately. Material is priced for both camshaft and gear. Camshaft may be removed without removing valves by blocking up lifters and inserting a nail in lifter holes.

R O11, 12, 14—Done by removing oil pan.

R Q3—See note R1.

R R1—Recommended procedure is to leave spring shackles connected to axle and detach spring at frame.

R R2—Applies to housing one side. Done by disconnecting spring shackle, hub and drum and unbolting housing.

R R5—Includes removal of all housings.

R S3—Applies to tighten, not adjust.

R S11, 12—Applies to new links.

R U14—Applies to new armature at list price.

R U17—Applies to block on back of switch.

R V7—Applies to fenders and running board.

ADDITIONAL OPERATIONS

Renew front radius rod, $3.50 labor or 1.9 factory hours. If necessary to remove axle $5.00 labor.

Renew rear radius rod $2.25 or 1.0 factory hours.

Renew front cross member $14.50 labor or 8.0 factory hours.

TUNE-UP AND REPAIR DATA

Main Bearings: Steel backed, babbitt lined. Renewable from **below.**

Rod Bearings: Steel shells, slip in type.

Rod and piston assemblies are removed from **above.**

Tappet Clearance: .012½-.013½ in. **Cold.**

Valve Timing: Inlet valve opens 9½ deg. or 3¼ flywheel teeth **before** T.C. Exh. closes 6½ deg., or 2¼ flywheel teeth **after** T.C. Marks on cam and crankshaft gears should be nearest each other and on line between shaft centers.

Ignition Timing: Full automatic advance. Spark occurs 4 deg. **before** T.C.

Seat Angle of Valves: 45 degrees.

Car Serial Number Located: On top of clutch housing.

Engine Number Located: Same as serial number.

Interrupter Point Gap: .015 in.

Spark Plugs: Std. Champion H-10. Set to .025 in.

Firing Order: 1R, 1L, 4R, 4L, 2L, 3R, 3L, 2R.

Number of Flywheel Teeth: 122.

Brake Make, and Drum Diam.: Own 12 in., self energized, cable operated.

Brake Lining Total Length: Front: 4 ft. 5 in. x 1¾ in. x .185 in. **Rear:** same. **Hand:** uses service shoes.

Oil Capacity Crankcase in Qts.: 4.

Transmission Oil, Lbs. or Pts.: 1¾.

Differential Oil, Lbs. or Pts.: 2½-3.

Cooling System Capacity: 15¼ qts.

Oil Pressure: 30 lbs. Adjustment located under intake manifold.

Compression Gage Pressure: 113 lbs. at cranking speed. Ratio 6.6 to 1.

Steering Gear Adjustment: Gemmer worm and roller type.

Carburetor: Stromberg.

Clutch: Long.

Universal Joint: Spicer.

Battery Terminal Grounded: Positive.

I. O. U.

(*Continued from page 27*)

sistently evades payment, I call up the personnel department where he works and they usually get on him at once. This is one of the most effective means of collection where a customer is employed at a factory or other large concern.

"When a customer asks to buy some tires or a battery on time, I find out how much of a purchase he can stand. If he can pay only a dollar or two a week, I may suggest that he buy only one or two tires instead of a whole set. I don't believe it pays to oversell, for most fellows have other obligations that are taking a weekly toll out of their pay envelopes.

"I expect my payments every week, but will let a customer go without paying for a couple of weeks without getting on him. Two weeks is about my limit, though, and if I anticipate too much trouble with the account, I go and get my merchandise.

"Except in the case of regular accounts where I am certain of the customer's reliability, I put out the merchandise on a "Lease and Loan Agreement." This is a form printed on a sheet of yellow paper, size 8½ x 11. It is signed in duplicate by the customer, and may every carry a witness signature. It reads:

"'This agreement between . . . . hereinafter designated as lessor, and . . . . phone number . . . ., make and model of car . . . ., license number . . . ., hereinafter designated as the lessee, covers the lease and loan of the following . . . .

"'The lessee agrees to pay weekly at the place of business of the lessor the accompanying schedule of rental installments which are hereby included in and made a part of this agreement.

"'If said lessee shall fail to pay promptly any rental installment when due, the lessor, without notice or any process of law, may take possession of above listed merchandise wherever it may be found, and in such event said lessee agrees to peaceably surrender same to lessor.

"'If said lessee is not in default on any rental installment, when all the rental installments which are part of this contract have been paid, the lessor hereby grants the lessee option of purchasing aforesaid merchandise for $ . . ., and all rental installments will be credited upon the purchase price.

"'Date. Signatures of Lessor and Lessee.'"

Along one side of this form are ruled spaces, twenty in number, headed, "Schedule of Rental Installments." Underneath are the words, "Date Due" and "Amount." Here, then, are credited the payments as they are made.

Mr. Sollenberger stated that through extending credit for gasoline to operators of trucks and to small business firms in the neighborhood, he thus gets their repair work. But he is able to do this successfully only by letting each one of these fellows understand that he won't tolerate any laxity in payment of bills.

This makes it necessary for him to be very alert and to have no hesitancy in asking the fellow for the money when it is due. On these accounts he allows 30 to 60 days. Once the customer begins to get lax, Mr. Sollenberger cuts him off, however, and makes him pay cash for his gas.

The Dayton man stated that in order to carry on a credit business the service station owner should have at least $1,000 in cash. This allows him to take his discounts when making purchases, and otherwise finance his operations.

He pointed out that by taking advantage of discounts on all merchandise he buys, he is able to save at least $500 a year. In addition, the fact that he pays cash for everything at supply sources also enables him in many cases to get better prices.

Selling Service

(*Continued from page 35*)

9. Advertise regularly and consistently. Use local newspapers for continuous daily coverage and house-to-house distribution of broadsides occasionally to feature special promotions and seasonal service needs.

10. Make a definite number of outside calls each month to solicit new customers. Contact all business men, but don't waste their time. Know your sales story well enough to present it in a manner to command attention.

Gang-Way FOR THIS GUY!

Amco BRAKE LINING

Winner of the twice around the block, speed—endurance—economy road race. More dangerous than Indianapolis. "Never touched me," he grins, as your brakes scream. Some day he'll zig when you think he's going to zag. Then *he'll* retire from road-racing . . . and *you*—you'll have your brakes relined.

ASBESTOS MANUFACTURING CO., Huntington, Ind.

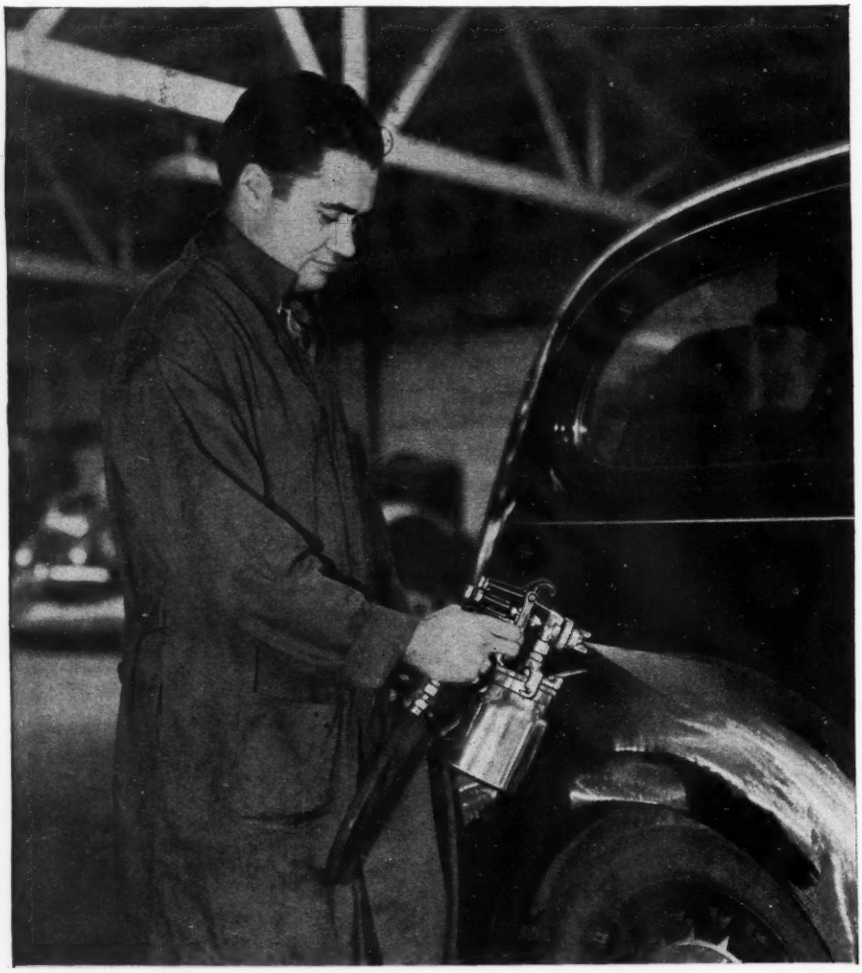
Alcohol Blends Gaining

About 250 service stations in Kansas, Missouri, Nebraska, Iowa, North and South Dakota and Minnesota are marketing motor fuel blends of alcohol and gasoline, it was stated by Dr. Leo M. Christensen of the Farm Chemurgic Council, who read a paper on the subject at the third Dearborn Conference of the council recently. Dr. Christensen said he expected the number of outlets to increase to 1000 within two or three months.

The blended fuel is made from gasoline and a fluid called "Agrol" which contains 78 per cent of ethyl alcohol, 6 per cent of other ingredients derived from farm products and 16 per cent of materials produced from coal. The present formula for Agrol contains but 0.8 per cent gasoline by volume. From the manufacturing plant at Atchison, Kan., it is carried to the refinery or bulk blending station where the blending takes place. The present plant is rated at 10,000 gal. of anhydrous ethyl alcohol in 24 hours.

The present cost of Agrol fluid is based on corn at 60 cents a bushel and the resulting alcohol costs 23.72 cents a gallon.

Not all gasolines respond satisfactorily to the addition of alcohol, said Dr. Christensen. The producers of the Agrol therefore require samples of the gasolines proposed for use and test them. In general, he said, gasolines with 63 to 65 octane antiknock ratings are used.



Modern Auto Shops Are Turning To

BINKS THOR 7 Spray Gun by the Hundreds

Write Today For Binks New Bulletin AD-116

BINKS MANUFACTURING CO.

3114-40 Carroll Avenue **Chicago, Ill.**

Shop Bookkeeping

(*Continued from page* 37)

ment on the first of each month from your depository. First compare the deposits listed on the bank statement with the pencil figures you have listed in your Cash Book under the heading "Cash" debit. Then sort the cancelled checks numerically and compare them with the entries you have made in the Cash Book under the heading "Cash" credit. If there is one you have written down that does not appear among those returned by the bank, write it down on the back of the bank statement where a space is made for such instances and these are called "outstanding checks". Add these outstanding checks and in the space prepared below write in the figure or balance taken from your General Ledger sheet No. 100 headed "Cash in Bank." Add these two figures and they should total the same as the balance shown on the bank statement as your balance in the bank. If there is still a difference, look back on the Cash Book and see if you have entered some cash which has not yet been deposited. If so, enter this figure on the back of the bank statement prepared for such instances and add to the bank balance. Both sides should now agree.

The check book should also be balanced each month with the bank statement. This is done by subtracting the total amount of outstanding checks from the balance shown on the bank statement. The difference should be the balance as shown by the check book.

There may be certain journal entries to be made each month in the case where a financial statement is prepared monthly. Depreciation should be figured in order to keep the records accurate. The percentages used are as follows:

Automobiles	20%	Annually
Machy. Tools & Equip.	10%	"
Furn. & Fixts	10%	"

To arrive at a monthly figure, take (for instance, automobiles) 20% of the total value which will be found on General Ledger sheet No. 400, and divide by twelve. For example, automobiles are valued at $1550.00 and 20% of that would be $310.00 and that divided by twelve would give $25.83. So the journal entry which you make each month will be as follows:

Debit Depreciation Automobiles (account No. 38)	$25.83
Credit Reserve for Dep'n Automobiles (account No. 701)	25.83

Use this same method in figuring the other two accounts, only the percentage will be different. These percentages are a fair allowance and permissable for tax purposes.

A new inventory should be taken at the end of each month in order to get a Cost of Sales for the financial statement. If the new inventory is larger than the one shown on the General Ledger sheet, make a journal entry debiting Inventory with the additional amount and crediting Parts Sales. If it is smaller, make the jour-

(*Continued on page* 48)

TRAILER BRAKES

(*Continued from page* 21)

making this test, battery should be charged sufficiently to turn the starting motor and brake pedal should be depressed so that current is going to both brakes.

In case the variation between opposite brakes is greater than one-tenth ampere check for poor connections or for a broken wire at the magnet. If the ammeter reading is less than 2.6 amperes, check the controller as well as all wires and connections.

When tractor brakes are adjusted, the brake pedal travel is changed and it is necessary to reset the controller to the new pedal travel to cover the full range of the controller.

The same rules apply to drums, bands and linings as apply to any other brakes. Untrue or badly scored drums must be turned or replaced, grease-soaked, improper or worn out lining must be replaced and untrue bands must be repaired or replaced.

The magnet facing may become glazed. This is not a characteristic of the facing but is caused by some foreign substance becoming imbedded in the material. A glazed facing will reduce the efficiency of the brake. The facing may be roughened with emery cloth or a light cut may be taken across it in a lathe. Do not cut down the pole faces.

Do not connect stop lights in the brake circuit. While this may seem to be a convenient means of operating a stop light, it will change the graduations of current passing through the controller, resulting in weak or grabbing brakes.

If armature or magnet is removed or other parts are changed which effect armature spacing (such as renewal of hub or drum), it may be necessary to properly space the armature in relation to the magnet. For proper operation, the armature should be depressed by the magnet a distance of 9/64 in. This dimension should not vary more than 1/64 in.

The brake mechanism is hidden by the wheel and drum when assembled and should be adjusted with a gage which may be used with the hub and drum removed.

The service department of the Warner Electric Brake Mfg. Co., Beloit, Wis., can supply a gage (Part No. 4679) for properly spacing armature with drum removed. (See Figs. 2 and 3.) This gage is used in the following manner. Place short ends of gage, against magnet face, slide adjustable rod against bearing seat on axle and tighten thumb screw in gage. Slide collar against frame of gage, tighten thumb screw in collar and loosen thumb screw in gage. Next place three wedges (equally spaced) between drum and armature to hold armature away from drum to the full extent of its travel. Then place long ends of gage against armature face, slide adjustable rod against face of inner wheel bearing cone and tighten thumb screw in gage. Do not forget to remove the three wedges from between the armature and brake drum before installing hub on axle.

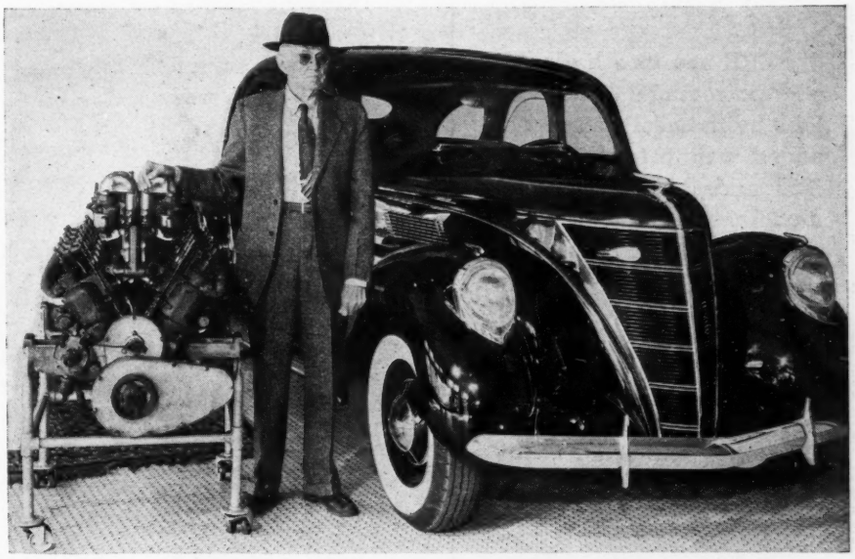
The distance "D" from collar to gage is the amount of armature depression after assembly and should be 9/64 in. If this dimension is found to be incorrect, it can be decreased by shims at bearing seat on axle "A" or increased by placing shims at "B."

Be especially careful to avoid getting grease on any part of the brake assembly and be sure that the wheel bearings are properly adjusted and packed with a good wheel bearing grease.

Cleaning Caravan

Cleveland's Circo Products Co.'s Cleaning Caravan, an automobile trailer, has taken to the road to demonstrate the two new units of CIRCO cleaning equipment.

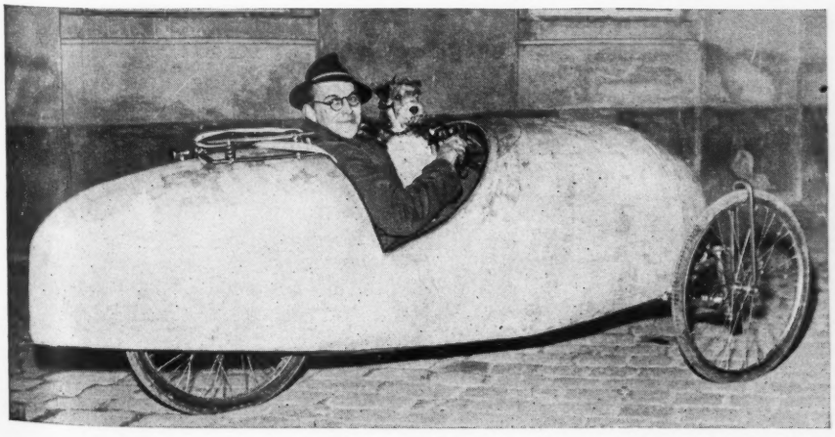
This new equipment consists of the Circo Cyclone Cleaner and the "Rex" Vapor Degreaser. The Cyclone Cleaner was developed for cleaning automobile and truck engines, either in or out of the chassis; for cleaning of undercarriage and for stripping paints, road oils, caked grease, etc. The "Rex" Vapor Degreaser was developed for degreasing engine blocks and parts out of the chassis.

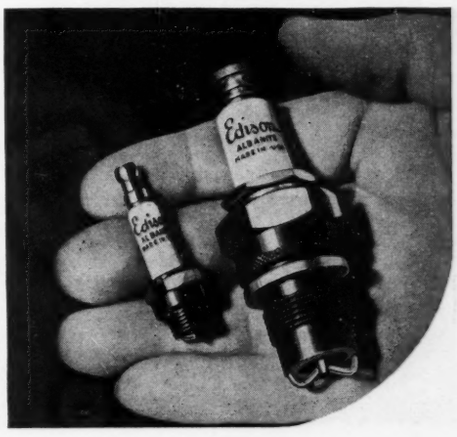


GEORGE M. SCHEBLER, (right) who invented the Schebler carburetor in the early days of the automobile industry, was the designer and builder of what is believed to have been the first V-12 automobile engine. He is shown here with his historic 12-cylinder engine and a new Lincoln-Zephyr which he purchased recently

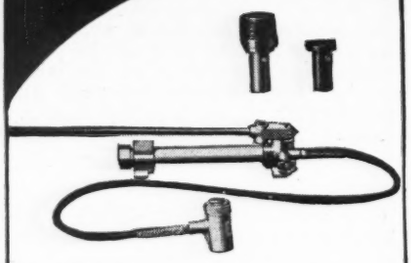
THE smaller spark plug (lower right) is the Edison 10 millimeter plug made by the Edison-Splitdorf Corp., West Orange, N. J. It has been adopted by the Indian Motorcycle Co. as standard equipment on all radio-equipped Indian machines being supplied to state and municipal police forces

A YOUNG European (below) proudly displays his homespun contraption —a three-wheel streamlined runabout built in his spare hours

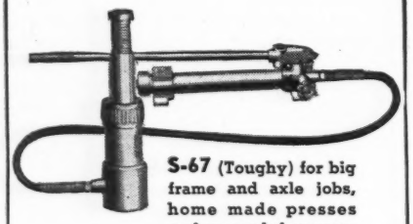




ADDED "Wallop" FOR PORTO-POWER



S-66 (Shorty) for close work on frames, fender wells and in cramped quarters.



S-67 (Toughy) for big frame and axle jobs, home made presses and general shop uses.

HERE are two hydraulic power units that do giant jobs by themselves and give added wallop to the famous S-50 and S-100 Porto-Power models.

The S-66 7-ton ram is only 4½" overall—plunger travel 2½". Two adaptors lock on plunger — serrated saddle, and a male adaptor for regular Porto-Power attachments.

The S-67 heavy duty 20-ton ram is 10¼" overall — screw extension, 3¾"— total height, 18". Diameter only 4" — for maximum power in close quarters. A "knockout" for "home-made" presses.

Remote pumps permit full-power operation of these rams in tight spots. S-66 priced at $38.20 — the S-67 at $52.50. Slightly higher on West Coast and in Canada. (Not included in regular S-50 and S-100 assortments.)

Ask your Jobber Salesman for details — or order from your jobber NOW!

BLACKHAWK MFG. COMPANY
Dept. MA-8 Milwaukee, Wis.

SEE OPPOSITE PAGE

BLACKHAWK

Shop Bookkeeping

(*Continued from page* 46)

nal entry just the reverse.

You have now finished all necessary entries for the month and proved all the control accounts. This means you are ready for the final picture of the business in the form of financial statement.

A Profit and Loss Statement and a Balance Sheet are shown below.

In preparing the Profit and Loss Statement, it will be noted that items under Expenses do not include such purchases as gas, oil, etc., which were made for resale. All such items are totaled separately and added to Inventory at the beginning of the month and called "Purchases for month". This is done in order to get an accurate Cost of Sales for the month.

Under Sales on the statement, it will be noted that only one figure is used and that is the total of all sales. This can be changed to read in detail, listing the different departments, if desired.

PROFIT AND LOSS STATEMENT

SALES		$2,150.00	
COST OF SALES			
Inventory beginning of month	$ 235.00		
Purchases for month	1,300.00		
TOTAL	1,535.00		
Inventory end of month	189.00		
COST OF SALES		1,346.00	
GROSS PROFIT			$ 806.00
EXPENSES			
Wages	256.00		
Rent	75.00		
Telephone	15.00		
Stationery, etc.	4.00		
Social Security Tax	2.00		
Insurance	25.00		
Heat and light	13.00		
Repairs	1.50		
Maintenance of Service Cars	3.00		
Depreciation automobiles	25.83		
Depreciation Furniture and Fixtures	7.00		
Depreciation Machinery, Tools and Equipment	9.00		
Interest	3.00		
Miscellaneous	4.75		
TOTAL EXPENSE			444.08
OPERATING PROFIT			361.92
OTHER INCOME			
Discounts earned			2.75
NET PROFIT			$ 364.00

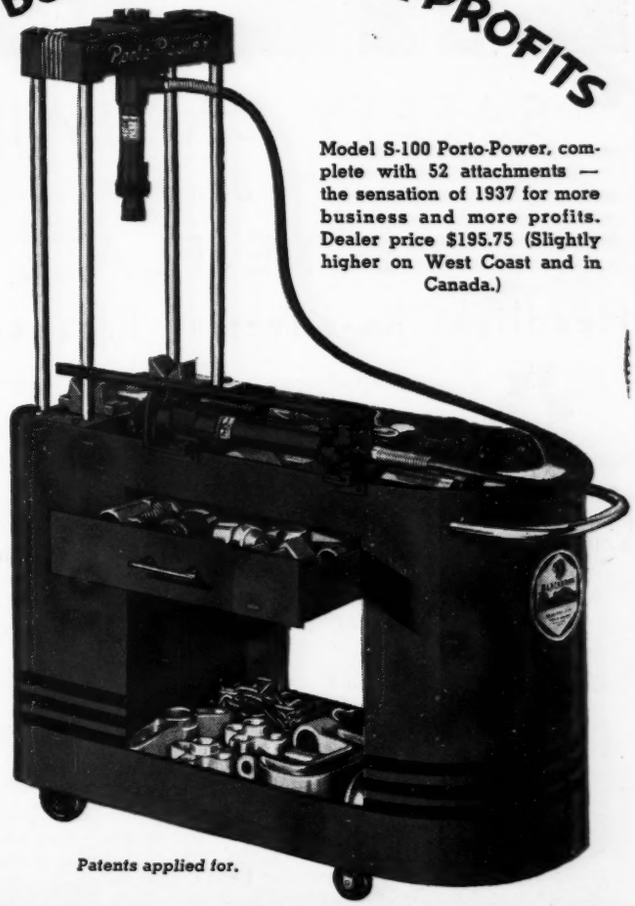
BALANCE SHEET

ASSETS			
CURRENT ASSETS			
Cash in Bank	$ 571.00		
Accounts Receivable	1,355.00		
Inventory	189.00		
TOTAL CURRENT ASSETS		$2,115.00	
FIXED ASSETS			
Automobiles	1,550.00		
Machinery, Tools and Equipment	475.00		
Furniture and Fixtures	250.00		
TOTAL FIXED ASSETS		2,275.00	
TOTAL ASSETS			$4,390.00
LIABILITIES			
CURRENT LIABILITIES			
Accounts Payable	$ 755.00		
Notes Payable, Bank	1,000.00		
TOTAL CURRENT LIABILITIES		$1,755.00	
RESERVES FOR DEPRECIATION			
Automobiles	25.83		
Machinery, Tools and Equipment	9.00		
Furniture and Fixtures	7.00		
TOTAL RESERVES FOR DEPRECIATION		41.83	
ACCRUED Social Security Tax		4.00	
INVESTMENT	2,224.50		
Profit for Month	364.67		
TOTAL INVESTMENT		2,589.17	
TOTAL LIABILITIES			$4,390.00

PORTO-POWER BRINGS ME THE LOW BID AGAIN

MORE and more shop-owners everywhere are getting the same glad news — because Porto-Power brings in the bacon! It's got everything you need to quote lower prices on body rebuilding and general repair work and still show a handsome profit on every job — even while you are paying for it! So get "hep" to Porto-Power and bring in more better-paying jobs.

MORE BUSINESS—MORE PROFITS



Model S-100 Porto-Power, complete with 52 attachments — the sensation of 1937 for more business and more profits. Dealer price $195.75 (Slightly higher on West Coast and in Canada.)

YOU darn tootin' — put Porto-Power in your shop *right now* — with a low first payment. It saves up to 50% and more of the time usually spent on body rebuilding, frame and axle straightening and general shop jobs. Remotely controlled *all-directional* hydraulic ram, big 4-column press, and a complete assortment of time-saving accessories including the exclusive Blackhawk "Flex-Heads." Ask your jobber salesman to demonstrate the new S-100 Porto-Power —and explain his Time Purchase Plans. Write for FREE book "Quick Set-ups for Quick Profits."

BLACKHAWK MFG. CO.
Dept. MA-8 MILWAUKEE, WISCONSIN

Exclusive Canadian Distributor:
THE CANADIAN FAIRBANKS-MORSE CO., Limited
Branches in all Principal Cities

Patents applied for.

See opposite page

BLACKHAWK Porto-Power

BLACKHAWK Porto-Power

Bear-Chicago School

(*Continued from page* 24)

"In addition to the mechanical training received, the student secures a knowledge of how to sell safety and correction service. He sees how Bear Service is sold to the car owner on the basis of ease of car operation, safety and economy. He learns how this service is presented to the car owner in terms of safety, economy in gas, oil and tires and elimination of drivers' fatigue.

"When a student arrives at one of the eight Bear Schools, he is first shown how to check a car completely and how to make the correction hookup. On this demonstration unit, he can familiarize himself with all of the gauges and learn the purpose of each. Instruction material is issued for study work and to obtain the theory of safety and correction service.

"After the student is in a position to know what he is doing, he then does practical work, such as handling checkups and correcting the cars that come into the school for actual correction work. The student is at all times with a Bear instructor, doing as much of the actual set-up and checking as he is prepared to do."

Mr. Dammann also pointed out that there is no charge made for this training.

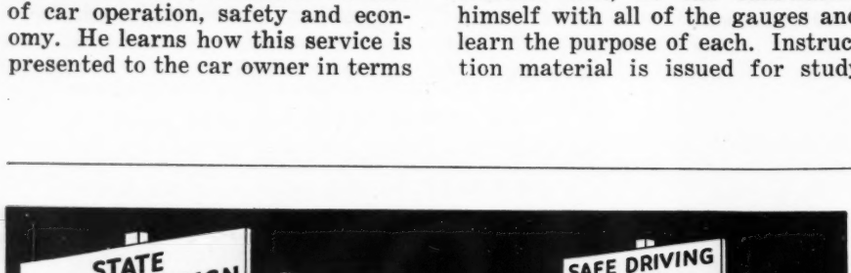
Wiring Bulletin Issued by Packard Electric

The Packard Electric Division of General Motors, at Warren, Ohio, has issued a Bulletin giving valuable information and suggestions on wiring to conform with the requirements of the Interstate Commerce Commission ruling regarding safety lighting requirements on buses, trucks and tractors. It also incorporates a new simplified chart to quickly determine the gage size of wiring required for various light loads, various lengths of circuits, etc. Ask for Bulletin No. F-23.

Hypoid Gear Flusher Offered by Linendoll

The danger of mixing hypoid lubricants necessitates draining and flushing differentials whenever additional lubricant is required. To provide an efficient means of doing this job, the Linendoll Corp., 228 N. LaSalle St.,

Chicago, Ill., has developed a "hot flusher" which sprays electrically heated flushing oil into the differential under air pressure. Provision is also made for sucking out difficult-to-drain oil, so that the differential will be thoroughly cleaned before new oil is added. Furnished complete for $34.50.


STATE SAFETY CAMPAIGN
AVOID DANGER SEE IN TIME
332 KILLED IN THIS COUNTY LAST YEAR DRIVE CAREFULLY
SAFE DRIVING PAYS
CITY OF . . . . . SAFETY FIRST
THIS IS CENTER COUNTY—ARE YOU DRIVING BLIND?
HAVE YOU HAD YOUR HEADLIGHTS RE-SILVERED?
DRIVE CAREFULLY Mayor.....

SAFETY CAMPAIGNS

Bring

SURE-PLATE

Headlight Re-silvering Prospects to You

Every car owner is talking, seeing, and thinking safety. State, local, and city safety campaigns, warning signs, and equipment requirements make prospects for brighter, safer headlights. Re-silvering with Sure-Plate makes dim headlight reflectors bright, efficient, and safe.
Take advantage of the safety market by buying a Sure-Plate kit for $12.50. It'll do $100.00 worth of business for you, return you $3.50 per re-silvering hour. And customers go away with headlight reflectors as good as new.

Seal Valve Port and Cylinder Cracks With

SURE-WELD

Sure-Weld is a sure way to satisfy customers, and get a big profit per satisfied customer. It's the quick, permanent way to seal cracked valve ports and cylinder blocks, aluminum and cast iron cylinder heads, and water jackets. It's unconditionally guaranteed, and customers don't mind paying *your* price for such service.
See your jobber today about Sure-Plate and Sure-Weld, or write.

SURE-RITE PRODUCTS CORPORATION
Andrews & Cedar Park Aves., Philadelphia, Pa.
Warehouse at 1910 Grand Ave., Kansas City, Mo.

Analyzing Vanderbilt Race Results

(*Continued from page* 26)

type of engine; 8, 12 and 16 cylinders are the vogue now, particularly where acceleration is a factor, and supercharged to the nth degree at that. Somewhere in the neighborhood of 140 m.p.h. has been the top speed developed by our cars, and when this is compared with the 170 to 200 m.p.h. performance turned in by foreign cars, it is evident that we have much to do along engine development lines.

Superchargers have definitely proved their worth, and will no doubt play an important part in the racing engines of the future. Four wheel independent suspension is undoubtedly a desirable feature. Whether rear-engine position is another contributing factor to better performance is a point still under discussion. Clutches, transmissions and brakes are sadly outclassed when compared with those units of foreign manufacture. High speed gear shifting is practically impossible with the transmissions used in American-made racing cars, and if it were possible, clutches would not stand the gaff. And as far as brakes are concerned—well, they are put on the car because the rules say that the car must be equipped with brakes, and not because they are intended to be used.

American sport fans don't enjoy playing second fiddle to anyone—when we are licked we take it with a grin and give credit where credit is due—but at the same time we make up our minds that something will have to be done about it to prevent getting licked again. And so we look for some radical improvements in our racing cars by the time the Vanderbilt race rolls around again next year.

How They Finished

Finish Position	Car Number	Car Name	Driver	Speed M.P.H.
1	4	Auto Union	Rosemeyer	82.56
2	15	Mercedes	Seaman	82.24
3	14	Alfa Romeo	Rex Mays	80.14
4	9	Auto Union	Von Delius	77.82
5	10	Alfa Romeo	Dr. Farina	77.75
6	22	Alfa Romeo	Joe Thorne	75.02
7	18	Burd Piston Ring	Bill Cummings	74.10
8	72	Burd Piston Ring	Rus Snowberger	73.8
9	45	Maserati	Wilbur Shaw	73.75
10	54	Rawhide Oilseal	Herb Ardinger	69.95
..	24	Brisko Special	Frank Brisko	R.F.
..	31		Chet Gardner	R.F.
..	33		Frank Wearne	R.F.
..	65		Milt Marion	R.F.

R.F.—Running at Finish

District Merchandise Manager

Horace I. McConnell has been named District Merchandise Manager of the Westinghouse Electric Supply Company for the Middle Atlantic District.

For the past twenty years Mr. McConnell has been manager of the Automotive Department. He will continue supervision of the Automotive Department, with C. T. Sommer remaining in charge of purchasing.

Failed to Finish

Car Name	Driver	Cause of Withdrawal
Maserati	Mauri Rose	Broken axle shaft.
Boyle Products	Jimmy Snyder	Broken transmission shifter fork.
Hartz-Miller	Ted Horn	Motor loose in frame, and transmission locked.
Alfa Romeo	Tazio Nuvolari	Fire in carburetor.
Miller	Billy Winn	Broken driveshaft.
Mercedes	Caracciola	Engine trouble—brake failure.
Alfa Romeo	E. Bjornstad	Clutch burned out.
Marks-Miller	Geo. Connor	Broken transmission.
Debaets	Harry Lewis	Lost magneto coupling.
Maserati	Babe Stapp	Broken piston.
Miller	Kelly Petillo	Rear axle locked.
Schumacher	Al. Cusick	Broken rear wheel hub.
Duray	R. Householder	Broken oil line.
Kimmel	Henry Banks	Lost rear axle shaft nut.
Ambler	Gus Zarka	Broken connecting rod.
Ambler	Ora Bean	Flywheel bolts sheared off.

IGNITION PARTS ODDITIES

TUNGSTEN (TUN STONE) MEANS "HEAVY STONE"

TUNGSTEN IS SO HARD IT SCRATCHES GLASS... YET WE ROLL IT OUT INTO SHEETS 0.001" THICK!

THIS IS THE TRADE MARK OF THE ONLY COMPLETE LINE OF BOXED TUNGSTEN CONTACTS IN WHICH JOBBERS NEED NOT STOCK ANY DUPLICATES.

WE IMPORT ORE FROM CHINA AND MAKE OUR OWN PURE TUNGSTEN IN NORTH BERGEN, N.J., JUST AS WE MAKE EVERY PART OF ALL TUNGSTEN CONTACT PARTS.

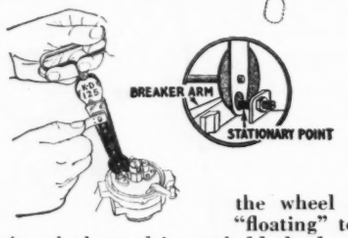
Genuine Tungsten Products

CONTACT OUR SALESMAN FOR THE INSIDE STORY OF TUNGSTEN!

TUNGSTEN CONTACT MFG. CO., Inc., North Bergen, N. J.

Demonstrating how to make big ones out of little ones is the purpose of this Ramco fleet which is touring the country. Each trailer is fully equipped with Ramconizing equipment for expanding and reshaping both cast iron and aluminum pistons. A Ramco engineer goes along to tell the story of Ramconizing and Ramco rings

New! K-D No. 125 UNIVERSAL IGNITION POINT REFACER *brings* SPEED and ACCURACY to an IMPORTANT JOB!



Refacing ignition points used to be one of the most uncertain jobs in the shop. Now, with the new K-D Ignition Point Refacer — it's easy, quick, sure!

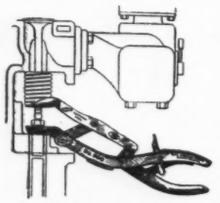
The miniature bonded-in-rubber abrasive wheel (*not* a coated paper) produces a polished, parallel face on the points and continues to cut freely and uniformly until completely worn through. 2 large and 2 small wheels are furnished, which will accommodate all sizes of distributors.

2-to-1 positive chain drive produces 6-inch cutting stroke on every turn of crank handle. That means SPEED! Contrast this to the tiny, uneven back-and-forth strokes of a file!

The spring pressure of the breaker arm holds the Floating Wheel PARALLEL between the two points at all times. This is only possible because the wheel is NOT fastened rigidly on its shaft but is left "floating" to conform to the correct angle of the points even though the tool is not held absolutely steady by the operator. These patented features provide positive, automatic alignment of the abrasive wheel.

Handle fastens to either end of drive shaft, permitting you to work on any type of motor without interference.

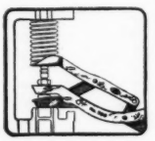
Made of pressed steel, 7 inches long. Attractive, rust-proof finish. Net weight 6 ounces. Dealer's Net Price $1.85 F.O.B. shipping point. Slightly higher in Canada.



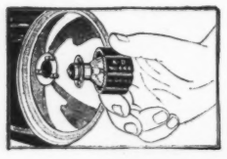
No. 900 in position on Plymouth 1936 motor. Note generous working space and clear view of valve.

No. 900 "Hi-Offset" Parallel JAW VALVE LIFTER
Total Lift 3" — Length 8¾"

This new K-D Tool is the **fastest** valve lifter for many makes of cars, including all models from 1935 of Chrysler, DeSoto, Dodge, Plymouth, Oldsmobile, Packard, Pontiac, Studebaker, Hudson and Terraplane. The unusually "Hi-Offset" jaws permit operation on these motors without removing the manifold. Unobstructed vision above L'fter makes the handling of keepers faster and easier. Net Weight 1 lb. Dealers Net Price $1.45 F.O.B. shipping point. Slightly higher in Canada.



Auxiliary jaws swing into position for motors with unusual clearance between tappet housing and valve spring washer.



No. 444 Lamp Bulb Glove

Made of specially cured rubber, with flexible gripping teeth molded on the inside. Protects fingers when installing or removing any style of Headlight Lamp Bulb. Small size and low price make it especially appealing to motorists. 24 Gloves mounted on attractive display card or on individual cards, for quick sale at 15¢ each retail.

No. 10 Plier Set

Forged and Tempered—For Ignition, Radio, Electrical and Home use. Just the right size (4¼" long) for small work. Milled Jaws, knurled handles, bright rust-proof finish. Packed in handy steel kit as shown, or individually. Dealers Net price $1.40 per set F.O.B. shipping point.

K-D MANUFACTURING CO.
Lancaster, Penna., U. S. A.

Why Do Repairmen?

(*Continued from Page 20*)

constructed with the thought of using it to service trucks. Formerly, we did not have enough floor space to service trucks in a separate department, so we provided a rear entrance in the new wing through which all trucks are brought into the shop, thus keeping this type of work separate from the passenger cars in the front. Passenger cars are moved into the new wing only when the front of the shop is crowded or for major repair work.

"A shop office was built on the service floor directly under the women's rest room. Formerly all accounting and payments for shop work were handled through the front office, but we found that occasionally a customer would forget to stop at the front office to pay a service bill unless the service man went with him. Under the new plan the service man turns in his time card and requisition sheet to the girl in the shop office, who immediately collects the amount or makes the proper charge."

Combustion Indicator Announced by Electro

Electro Products Co., 621 East 216th St., New York City, has announced a new combustion analyzer that is easy to operate and weighs only 6¼ lb. Operates with self-contained bat-

teries and requires no outside wires. Dial is calibrated to show "lean," "average" and "rich" as well as "idling" ranges. Furnished complete with batteries, 12-ft. gum rubber sampling hose, tail pipe connection and operating instructions. Net price to dealer, $39.50.

Good Service

WE PRACTICE WHAT WE PREACH!

with prompt deliveries to your door

The kind of service you give your customers depends, to a great extent, upon the kind of service we give you. That's why in every community you'll find trucks (like the one shown above) making prompt and rapid deliveries to garages that display the sign "Genuine Ford Parts." That's why every Genuine Ford Parts distributor keeps an adequate stock of all necessary parts on hand for your convenience.

The thousands of Ford owners in your community represent your number one market. The Genuine Ford Parts sign on your shop will bring them in. Good service, good workmanship and the better jobs they will get through the use of Genuine Ford Parts in their Ford cars will keep them as your customers.

If you don't display the Genuine Ford Parts sign on your shop now, call your parts distributor today. He'll tell you also why you'll get better service, give better service and make more money when you use and sell Genuine Ford Parts.

GENUINE FORD PARTS

WITH GENUINE FORD PARTS YOU GET THESE ADVANTAGES

- *More satisfied customers.
- *Prompt deliveries to your door.
- *Complete merchandising assistance.
- *Ford Engine and Parts Exchange Plan.
- *"Genuine Ford Parts" Sign.
- *Service information and assistance.

FORD MOTOR COMPANY

GENUINE Ford PARTS

Current Control

(*Continued from page* 23)

through the armature, through the points, to the battery as shown by the arrows. This current flows through the current winding in the right direction to add to the magnetic force holding the armature down.

Should the generator slow to below generating speed or stop, current will begin to flow from the battery to the generator. The direction of current flow in the voltage winding is always the same, to ground, and, therefore, its magnetic field is always in the same direction. But with the direction of current flow in the current winding reversed, its magnetic field is reversed. The two magnetic fields of the two windings now buck each other and the resultant magnetic force is no longer strong enough to hold the armature down. The armature is pulled up by its spring tension and the circuit is broken.

Regulators are also magnetic switches which operate on a similar principle and their function is to alternately insert and remove resistance in the generator field circuit. Regulators cannot increase generator output beyond the maximum for which the generator is designed.

Anyone who has ever twirled a resistance knob knows that inserting a resistance in the generator field circuit reduces the strength of the magnetic field and consequently will reduce the generator output.

Chevrolet has used a light switch controlled field resistance for the past few years. This is shown schematically in Figure 1. When the light switch knob is pushed all the way in, the generator field switch is open and the field is grounded through the resistance, thus resulting in a reduced generator output. If the light switch knob is pulled out to any other position, the field is grounded directly at the switch, allowing the generator output to increase. This is a manually controlled switch.

The same operation may be done magnetically, by means of a magnetic switch. The windings of the magnetic switch or regulator may be composed of a few turns of heavy wire as in the current winding of the cut-out relay, or of many turns of fine wire as in the voltage winding of the cut-out relay, or a combination of the two.

In the vibrating current regulator, the windings are composed of a few turns of heavy wire and carry the entire output of the generator. A current regulator is shown schematically in Figure 2. The simplified circuit shows the units, without the windings, as simply switches, which, of course, they are.

The contact points are normally held closed by spring tension which retains the armature in the up or closed point position and the current flowing in the generator field is conducted directly to ground through the points. When the current flowing through the current regulator windings—which is the output of the generator—reaches the value for which the regulator has been set, sufficient magnetic force is created to overcome the armature spring tension and the contact points are separated. It can be seen (Figure 2) that with the points separated the resistance is in the generator field circuit and the generator output is reduced.

But the instant the current flowing through the regulator windings begins to drop off, the magnetic force created by the regulator windings also drops off so it can no longer retain the armature in the down or open point position, causing the points to close. With the resistance now out of the generator field circuit, the generator output increases, but upon reaching the value for which the regulator is set, the armature is again pulled down and the resistance inserted in the generator field. This is a vibrating action which takes place so rapidly that the armature cannot be observed to move, regulating for a practically constant output.

The current regulator operates at but one setting, that is, if the generator is rated as a 28 ampere capacity unit, the regulator is set for this output and will operate only when the generator speed is high enough so that it attempts to exceed the 28 ampere setting. Thus the current regulator may be considered as a current limiting device. Figure 3 illustrates the action of the current regulator.

Allbestos 21

A PRODUCT OF 18 YEARS OF KNOWING HOW

1928 1929 1930 1931 1932 1933 1934 1935 1936 1937

Here's a way to hold your present brake lining customers against ANY competition — and get new ones. Install Allbestos 21.

Allbestos 21 is a zinc-wire lining, ground to size, selling at the No. 35 list. Cured at a temperature higher than that encountered in service — will not score, glaze or FADE; despite high speeds and heat. Uniform in density, size and co-efficient of friction—remains constant all the way thru. Gives a soft—quick—SAFE brake!

Unexcelled if used with any good Moulded Brake Lining, where an engineered set is desired.

Install Allbestos 21. You're sure of a good, safe brake for your customers—more profits for yourself. Get details—write for price list.

ALLBESTOS CORPORATION
Germantown, Philadelphia, Pa.

ALLBESTOS 21
UNIVERSAL BRAKE LINING

Another current limiting device which is so well known it needs no comment is the third brush of the third brush generator. Due to the third brush effect, the generator cannot, within the stated voltage range, exceed the output for which the third brush has been set.

But a peculiar feature of a third brush generator is that as the voltage increases, the output increases. Thus with a fully charged battery, when only a small amount of current is needed, the third brush generator will keep on "pushing out" maximum output, causing the battery voltage to mount higher and higher due to this overcharge. And the higher the battery voltage, the higher the generator output with the result that the battery and ignition points are soon ruined.

In order to prevent this excessive voltage, it is necessary to use some form of voltage regulation with the higher output generators in use today. One type of generator voltage control is the step-voltage control. This is a magnetic switch which, when the battery becomes fully charged, inserts a resistance into the generator field circuit, reducing the generator output. This resistance remains in the generator field circuit until the line voltage drops about a volt due to the battery becoming partly discharged or to an increase in the electrical load. This unit performs the same function as the light switch controlled generator field resistance illustrated in Figure 1. It does not vibrate. It inserts the resistance in the generator field circuit when the battery is fully charged and removes it after the battery becomes partly discharged. This type of generator output control is used on a comparatively small number of applications.

Illustrated schematically in Figure 4 is a vibrating voltage regulator. Note the simplified diagram is exactly as shown for the current regulator in Figure 2. The voltage regulator windings are of two types, a voltage or shunt winding of many turns of fine wire, and a current or series winding of a few turns of heavy wire.

The voltage winding is grounded at one end and is connected to the "off" side of the ignition switch at the other end. When the ignition switch is turned on, the winding has battery voltage impressed upon it. This is desirable because it is battery voltage we wish to regulate. The off side of the ignition switch is used so that when the ignition is turned off, the regulator voltage winding circuit is opened.

When the battery voltage is low, the voltage regulator is inoperative. As the battery approaches full charge, its voltage becomes great enough to force sufficient current through the regulator voltage winding to cause the regulator to operate, pulling the armature down and separating the contact points. The generator field current is then forced to flow through the resistance to ground, causing a reduced generator output.

When the points are closed, the generator field current is conducted to ground through the regulator current winding and the points. When the points separate, the current winding magnetic field collapses completely, and the points quickly close again.

The voltage winding is the governing winding, the current winding acting merely as an "accelerator" winding to speed up the action of the armature. This is a vibrating action which takes place very rapidly, regulating for a constant voltage.

By regulating to battery voltage, the output of the generator is controlled to the amount needed to maintain the correct charged battery voltage. But the vibrating voltage regulator varies the generator output in direct ratio to the battery voltage and thus in direct ratio to the state of charge of the battery, tapering the output down to just meet battery requirements and the requirements of the connected electrical load.

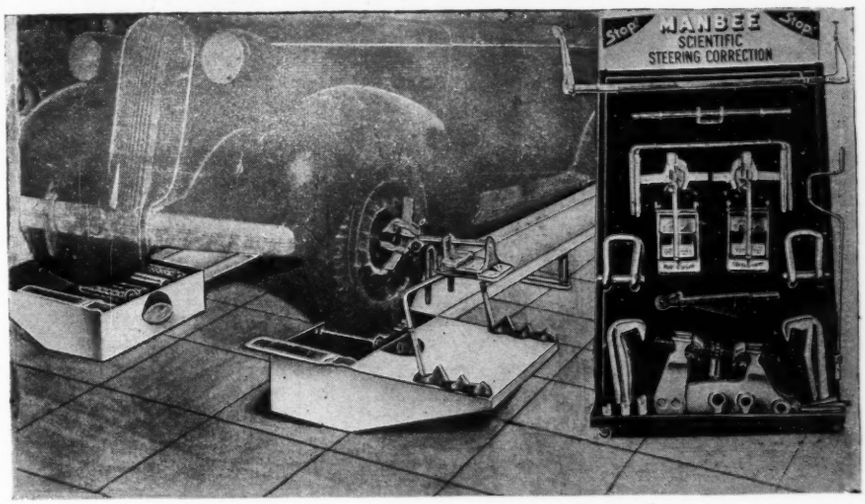
The voltage regulator unit may be used with either of the two current limiting devices, the third brush generator, or the vibrating current regulator with the shunt generator.

When the vibrating voltage regulator is used with the vibrating current regulator, they are mounted on the same base for convenience and enclosed by the same cover. Either one

(*Continued on page* 56)

The answer to "Safety Drive" problems

AND A MASTER MERCHANDISER



No. 1000—STEERING ANALYZER COMBINED WITH No. 200 A.T. AXLE STRAIGHTENER AND DISPLAY BOARD. This steering equipment can be used either with the number No. 500 drive on rack as shown or with the brake testing roller beds placed directly on the floor (a leveling device is provided). The brake testing lever furnished with the roller beds is exceptionally accurate. WHEN THE RACK IS OMITTED THERE IS A BIG SAVING IN COST AND FLOOR SPACE.

"PRODUCES MORE DOLLARS PER INVESTED DOLLAR"

THAN ANY EQUIPMENT IN THE SHOP, IS THE WORD RECEIVED FROM HUNDREDS OF WELL SATISFIED USERS. This equipment excels all other equipment of its kind for completeness, accuracy and simplicity.

Present day steering problems cannot be solved with obsolete equipment.

PLEASE ASK YOUR JOBBER FOR DETAILS OR WRITE DIRECT TO

MANBEE EQUIP. CO.

44 N. WASHTENAW AVE., CHICAGO

(*Continued from page* 55)
or the other of the units may operate at any one time, never both.

When the requirements of the connected electrical load are large and the battery is low, the current regulator will operate to prevent the output from exceeding the rated output of the generator. If the requirements of the connected electrical load are reduced and the battery comes up to charge, the voltage regulator operates to taper down the output and prevent high voltage in the circuit, reducing the generator output to what is required by the connected electrical load plus a small sustaining charge of a few amperes to the battery. Refer to Figure 3.

Figure 5 illustrates schematically a current and voltage regulator. Note the simplified circuit is identical to the regulators previously shown except that there are now two switches in the generator field circuit and an added field resistor. On some models two resistance units are used, as illustrated, in order to obtain two different values of resistance, a low resistance for the current regulator when the two resistors are in parallel, and a higher resistance for the voltage regulator, when a single resistor is used.

On some models there is an added terminal (marked in this instance "R") and an auxiliary set of contact points on the cut-out relay armature through which the starting motor solenoid relay circuit is grounded. This is not a part of the generating system.

Don't Forget Compression

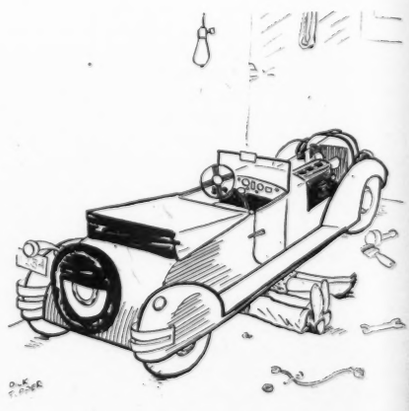
(*Continued from page* 19)

Of equal importance to pistons and rings when it comes to oil consumption is main and rod bearings. If these bearings are worn, the oil thrown off will be in such quantities that the pistons and rings will be unable to keep it down and excessive oil consumption will result. Naturally such bearings should be replaced and today this is a simple matter as the majority of cars are equipped with slip-in type bearings.

The problem of determining if the bearings should be replaced is easily determined by means of an oil pressure test tank. With such a unit all the bearings are quickly tested. All that is required is to remove the oil pan and connect the test tank to the lubricating system of the engine. It is not necessary to remove the bearings from the crankshaft.

The test tank supplies oil under pressure to the bearings and then with the engine being cranked slowly, the amount of oil leaking from each bearing is carefully noted. Excessive leakage indicates a worn bearing which should be replaced. No leakage is also cause for alarm as it may indicate a clogged oil line. Defective bearings should be replaced, not adjusted.

Of course with the engine open, it affords the opportunity to check a lot of parts, valves, valve springs, wrist pins, valve guides, oil pump, and timing chain or gears. In addition be sure that the distributor, carburetor and wiring are checked and new parts installed wherever necessary. In connection with the distributor, it is false economy to try and recondition a set of points that have been in service for over 20,000 miles. As a matter of fact, it is virtually impossible to adjust such points to obtain the correct cam angle. Use new points in order to get full power.



NEW VAN DORN

Lectro-Kleen PROCESS

$135 COMPLETE

A COMPLETE CAR-CLEANING METHOD

NOW a complete car-cleaning job is a matter of minutes instead of hours—with the new Van Dorn Lectro-Kleen Process. Ideal for automobile dealers for cleaning and polishing trade-ins for resale, for the modern garage, auto laundry or service station. Get the facts about the amazing new Van Dorn Lectro-Kleen Process. See it at your Van Dorn Jobber's—or write for details. The Van Dorn Electric Tool Co., 727 Joppa Road, Towson, Maryland.

(Div. of The Black & Decker Mfg. Co.)

AUTOMOTIVE EQUIPMENT TIME PAYMENT PLAN

NEW "Van Dorn" LECTRO-KLEEN PROCESS

VACUUM CLEAN CAR—upholstery, lining, floor mats, with Van Dorn Vackar Vacuum Cleaner.

RENOVATE UPHOLSTERY—removing grease, oil spots, with Van Dorn Lectro-Kleener and rotary brush on Polisher.

QUICK-DRY UPHOLSTERY—with Van Dorn Vackar which removes excess moisture from upholstery.

CLEAN AND POLISH exterior of the car in one operation with the Van Dorn Electric Polisher and Lectro Machine Polish.

FREE

This sensational offer calls for

QUICK ACTION

No, we're not crazy. It's just good business— for you and for us...

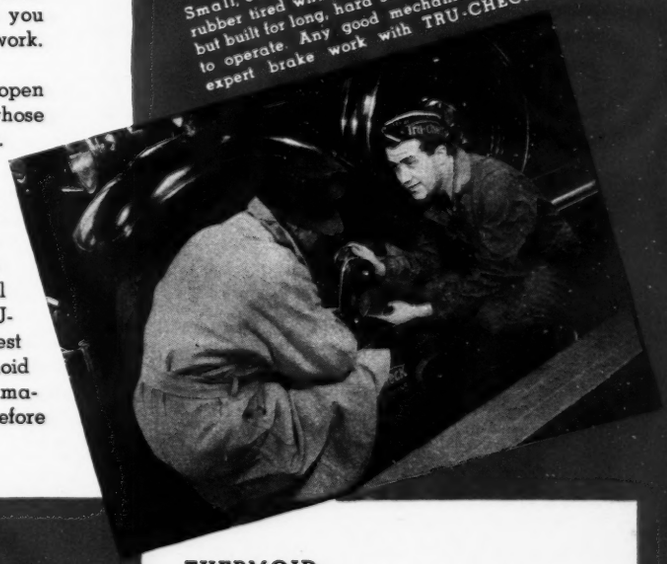
It's true—we are giving away FREE to aggressive brake shops one of the sales building, service improving TRU-CHECK Brake Testers, after having sold thousands of them to shop owners at the original price of $59.50.

Why are we giving TRU-CHECK away just like that? Because, frankly, we have sold so many of them that we have been able to absorb our large original investment in equipment and die costs, etc. But the chief and most important reason is this: Our experience with the thousands of dealers who now own TRU-CHECK has definitely proved to them and to us that TRU-CHECK helps sell more brake linings and brake service work.

TRU-CHECK has proved itself as the best brake job salesman you'll ever hire. It enables you to prove to your customers, just by pointing to the dial of the machine, that service work is necessary. It also, naturally, helps you to do more accurate brake work.

But, this offer is limited. It is open only to the 500 dealers whose coupons get into the mail *first*. It'll be "first come, first served". Postmark dates will be checked carefully so it doesn't matter in what part of the country you are located. It's when you mail it that counts. To get TRU-CHECK, you only have to invest in a balanced stock of Thermoid Brake Linings now and the machine is yours FREE. Act—before it's too late!

Small, compact, portable, mounted on rubber tired wheels. Weighs only 40 lbs., but built for long, hard service and simple to operate. Any good mechanic can do expert brake work with TRU-CHECK.



★ **Tru-check** ★

BRAKE TESTER

THERMOID CO., Trenton, N. J.

In Canada, **THERMOID** *Ltd., Toronto*

THERMOID
Trenton, N. J.

Quick—have your Distributor's Salesman call with details of your special Brake Lining Deal which includes TRU-CHECK Brake Tester FREE!

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City..... State.....

Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Dlvd.)	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE															CHASSIS					
					No. of Cylinders, Bore and Stroke	Taxable HP.	Piston Displacement (Cu. Ins.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension
1	Buick 37-40	950	122	6.50/16	8-3 5/8x4 1/2	30.6	248.0	100-3200	5.70	39.2	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.40	IC
2	Buick 37-60	1162	126	7.00/15	8-3 1/16x4 1/8	37.8	320.2	130-3400	5.90	42.7	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	3.90	IC
3	Buick 37-80	1418	131	7.00/16	8-3 1/16x4 1/8	37.8	320.2	130-3400	5.90	39.4	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.22	IC
4	Buick 37-90	1966	138	7.50/16	8-3 1/16x4 1/8	37.8	320.2	130-3400	5.90	40.2	Cl	LB	Ala	No	AC	SM	Wal	D	Del	P.Own	Own	m-Spi	½ Own	4.62	IC
5	Cadillac V8-60 & 65	(f)	124-131	(t)	8-3 1/16x4 1/2	39.2	346.0	135-3400	6.25	40.9	Cl	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	(u)	IC
6	Cadillac V8-70 & 75	(h)	131-38	7.50/16	8-3 1/16x4 1/2	39.2	346.0	135-3400	6.25	41.4	Cl	Mor	Ala	Han	AC	Str	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	(v)	IC
7	Cadillac V12-85	3535	138	7.50/16	12-3 1/16x4	46.9	368.0	150-3600	6.00	40.8	Cl	Mor	Ala	Han	AC	DL	Own	D	Del	P.Long	Own	Nb-Mec	½ Own	4.60	IC
8	Cadillac V16-90	7545	154	7.50/17	16-3x4	57.6	452.0	185-3800	6.00	40.5	Cl	Mor	Ala	Han	AC	DL	Own	D	D	dp.Own	Own	Nb-Mec	¾ Own	4.64	IC
9	Chevrolet Master	667	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	35.4	Cl	Own	Cl	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	3.73	C
10	Chevrolet Mas.DeL.	739	112¼	6.00/16	6-3 1/2x3 3/4	29.4	216.5	85-3200	6.25	39.0	Cl	Own	Cl	No	AC	Car	Own	D	D	P.Own	Own	m-Own	½ Own	4.22	IC
11	Chrysler Roy. C-16	910	116	6.25/16	6-3 5/8x4 1/4	27.3	228.1	93-3600	6.50	38.8	Cl°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
12	Chrysler Imp. C-14	1100	121	6.50/16	8-3 1/4x4 1/8	33.8	273.8	110-3600	6.70	41.7	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
13	Chrysler.Cus.Im.C-15	2060	140	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	....	Al	Mor	Ala	Pur	AC	Str	NS	A	Wil	P.B&B	WG	Nb-UP	½ Own	4.55	IC
14	Chrysler.Airflow C-17	1610	128	7.50/16	8-3 1/4x4 7/8	33.8	323.5	130-3400	6.50	40.3	Al	Mor	Ala	Pur	AC	Str	Bur	A	Wil	P.B&B	WG	Nb-UP	½ Own	4.30	C
15	Cord 812	(i)	125-132	6.50/16	8-3 1/2x3 3/4	39.2	288.6	115-3600	6.32	40.3	Al	Whit	Al	Ne	AC	Str	NS	A	USL	P.Long	Own	Ben	Tu Own	4.70	IT
16	Cord S.C. 812	(j)	125-132	6.50/16	8-3 1/2x3 1/4	39.2	288.6	175-4200	6.32	40.3	Al	Whit	Als	No	AC	Str	Pratt	A	USL	P.Long	Own	Ben	Tu Own	4.70	IT
17	De Soto S-3	870	116	6.00/16	6-3 5/8x4 1/4	27.3	228.1	93-3600	6.50	39.0	Cl°	Mor	Ala	Pur	Bur	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	IC
18	Dodge Six	820	115	6.00/16	6-3 1/4x4 3/8	25.3	217.8	87-3600	6.50	38.7	Cl	Mor	Als	Pur	AC	Str	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C
19	Duesenberg J	.....	142-153½	7.00/19°	8-3 3/4x4 3/4	45.0	419.7	320-4200	5.20	....	Cl	LB	Al	Pur	Yes	Str	.....	D	Exi	dpLong	Own	m-Spi	½ Own	.....	C
20	Ford V8-60	604‡	112	5.50/16	8-2.6x3.2	21.6	136.0	60-4200	6.6	30.4	Al	Gear	CS	No	Yes	Str	Own	O	Own	P	Own	m-Spi	¾ Own	4.44	Tr
21	Ford V8-85	645‡	112	6.00/16	8-3 1/8x3 3/4	30.0	221.0	85-3800	6.12	37.9	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78	Tr
22	Graham 85	770	111	(s)	6-3x4	21.6	169.6	70-3500	6.80	35.7	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Ill	WG	Nb-UP	½ Spi	4.55	C
23	Graham 95	905	116	6.00/16	6-3 1/4x4	25.3	199.1	85-3800	6.70	37.9	Al	LB	Als	No	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.45	C
24	Graham S.C. 116	1050	116	6.25/16	6-3 1/4x4	25.3	199.1	106-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
25	Graham S.C. 120	1160	116-120	6.50/16	6-3 1/4x4 3/8	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	D	Wil	P.Long	WG	Nb-UP	½ Spi	4.27	C
26	Hudson 6-73	945	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.8	Cl°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
27	Hudson 8, 74-5-6-7	1010	122, 129	6.25/16	8-3x4 1/2	28.8	254.0	122-4200	6.25	41.2	Cl°	Ge°	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
28	La Salle V8, 37-50	1260	124	7.00/16	8-3 5/8x4 1/2	36.4	322.0	125-3400	6.25	41.0	Cl	Mor	Ala	Han	AC	SC	Old	D	Del	P.Long	Own	Nb-Mec	½ Own	3.92	IC
29	Lincoln V12	4450‡	136-145	7.50/17	12-3 1/4x4 1/2	46.8	414.0	150-3400	6.38	38.9	Al	Ch	Ala	Pur	Yes	Str	Own	A	Exi	P.Long	Own	m-Spi	FF Tim	4.58	C
30	Lincoln-Zephyr	1265‡	122	7.00/16	12-2 3/4x3 3/4	36.3	267.3	110-3900	6.7	42.6	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Own	¾ Own	4.44	Tr
31	Nash Amb. 6, 3720	960	121	6.25/16	6-3 5/8x4 3/8	27.3	234.8	93-3400	5.67	36.2	Cl	Whit	Als	BS	AC	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.11	C
32	Nash Amb. 8, 3780	1080	125	7.00/16	8-3 1/8x4 1/4	31.2	260.8	105-3400	5.64	35.5	Cl	Dia	Als	BS	Bur	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.10	C
33	Nash Lafay 400-3710	810	117	6.00/16	6-3 5/8x4 3/8	27.3	234.8	90-3400	5.61	37.4	Cl	Whit	Als	.....	Bur	Str	Wal	A	USL	P.B&B	Ot	Nb-Mec	½ Own	4.11	C
34	Oldsmobile F37	875	117	6.50/16	6-3 7/16x4 1/8	28.4	229.7	95-3400	6.10	38.1	Cl	Whit	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
35	Oldsmobile L37	990	124	7.00/16	8-3 1/4x3 7/8	33.8	257.1	110-3600	6.20	39.1	Cl	LB	Ala	No	AC	Car	Var	D	D	P.B&B	Own	Nb-Mec	½ Own	4.37	IC
36	Packard 115C	995	115	6.50/16	6-3 7/16x4 1/4	28.3	237.0	100-3600	6.30	39.7	Cl	Mor	Als	No	AC	CG	Old	D	Wil	P	Own	Nb-Mec	½ Own	4.36	IC
37	Packard 120C	1170	120	7.00/16	8-3 1/4x4 1/4	33.8	282.0	120-3800	6.50	40.7	Al	Mor	Als	No	AC	SC	Old	A	PD	P	Own	Nb-Mec	½ Own	4.09	IC
38	Packard 1500, 1, 2	2480	127-34-39	7.50/16	8-3 7/16x5	32.5	320.0	130-3200	6.50	41.0	Al	Mor	Als	Pur	AC	Str	Old	DA	PD	P	Own	Nb-UP	½ Own	4.69	IC
39	Packard 1506, 7, 8	3670	132-39-44	8.25/16	12-3 7/16x4 1/4	56.7	473.0	175-3200	6.40	46.8	Al	Mor	Als	Pur	AC	Str	Old	DA	PD	P	Own	Nb-Spi	½ Own	4.41	IC
40	Pierce-Arrow 1701	3375	138-144	7.00/17	8-3 1/2x5	39.2	385.0	150-3400	6.40	37.6	Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
41	Pierce-Arrow 1702	3895	138-144	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	42.0	Al	Whit	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
42	Pierce-Arrow 1703	5015	147	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	40.7	Al	Wh t	Als	Pur	AC	Str	Buf	D‡	Wil	P.Long	WG	Nb-UP	½ Own	4.58	C
43	Plymouth P3	665	112	5.50/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.7	Cl	Mor	Ala	No	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	3.90	C
44	Plymouth P4	745	112	6.00/16	6-3 1/8x4 3/8	23.4	201.3	82-3600	6.70	36.5	Cl	Mor	Ala	Pur	BA	Car	NS	A	Wil	P.B&B	Own	Nb-UP	½ Own	4.10	C
45	PontiacDeL.6,37-26CA	F36	117	6.00/16	6-3 7/16x4	28.3	222.7	85-3600	6.20	38.5	Cl	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC
46	Pontiac DeL.8,37-28A	894	122	6.50/16	8-3 1/4x3 3/4	33.8	248.9	98-3800	6.20	40.5	Cl	Mor	CHI	No	AC	Car	BO	D	Del	P.Own	Own	Nb-Mec	½ Own	4.37	IC
47	Studebaker Dict. 6	880	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	Cl	Dia	Ly	Fram	AC	SC	Buf	A	Wil	P.B&B	WG	Ru-Th	½ Spi	4.55	C
48	Studebaker Dict. Pl.	900	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.00	40.2	Cl	Dia	Ly	Fram	AC	SC	Buf	A	Wil	P.B&B	WG	Ru-Th	½ Spi	4.55	IT
49	Studebaker Pres.	1165	125	6.50/16	8-3 1/16x4 1/4	30.0	250.4	115-3600	6.50	39.9	Al	Dia	Ly	Fram	Bur	Str	Bur	D	Wil	P.Long	WG	Nb-Spi	½ Spi	4.55	IT
50	Terrap DeL.&Sup.6	790	117	6.00/16	6-3x5	21.6	212.0	98-3900	6.25	38.3	Cl°	Ge	Al	No	AC	Car	Old	A	Nat	P.Own†	Own	Nb-Spi	½ Own	4.11	C
51	Willys 37	545	100	5.50/16	4-3 1/8x4 3/8	15.6	134.2	48-3200	5.70	32.2	Cl	LB	Cl	F-O	AC	Til	Buf	A	USL	P.B&B	WG	m-UP	½ Own	4.30	C

ABBREVIATIONS—General

°—Others also
•—Measured on rim of Flywheel
½—Semi-floating
¾—Three-quarter floating
†—Power Clutch
††—With clearance of .015 the valve is .004 off its seat.
‡—Does not include Federal Taxes
§—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(−¼ to +½)
A—Above (rods removed from)
A—After top center
AA—Automatic adjuster
Ad—Advanced **Al**—Aluminum
Ala—Aluminum, Anode processed
Als—Aluminum with struts
Au—Automatic (b)—0 to −½
B—Below (rods removed from)
B—Before top center
Bm—Before marks on vibration damper
(c)—60, ¼−1; 65, −¼ to +¼

C—Conventional
C—Cold (Tappet clearance)
Ch—Chain
CHI—Chrome Nickel Iron
Cl—Cast Iron **CS**—Cast Steel
(d)—60, ¼−1; 65, 0 to ½
dp—Double plate clutch
(e)—60, 4°51′; 65, 5°38′
(f)—60-1660, 65-2090
F—Floating (Piston Pin)
FF—Full floating
(g)—60, 155X; 65, 170X
(h)—70-2595, 75-2815

H—Hot (tappet clearance)
(i)—2445-2860 **IC**—Independent coil
IT—Independent Transverse
(j)—2960-3375
(k)—Intake, .0125—Exhaust, .0156
Ly—Lynite **m**—Metal
M—Mechanical **N**—Negative
(n)—Intake, .0124—Exhaust, .0156
Nb—Needle bearing
Ot—Overdrive transmission
P—Piston (Pin Locked in)
P—Single plate clutch
PH—Power operated, hydraulic brakes

R—Rod (Pin locked in)
(r)—Out only **Ru**—Rubber
(s)—2 door sedan 5.25/17, 4 door sedan 6.00/16
(t)—60, 7.00/16; 65, 7.50/16
TC—Top Center
Tr—Transverse **Tu**—Tubular
(u)—60, 3.69; 65, 4.30
(v)—70, 4.30; 75, 4.60
Var—Various
x—At 1000 R.P.M.
y—At 2800 R.P.M.
(z)—Or Champion

Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	RINGS: No. and Width Comp.	RINGS: No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES: Head Diameter and Seat Angle: Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance: Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C.: No. of Degrees	No. of Flywheel Teeth	IGNITION: Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing: Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE: Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number
OH	S...	106	AC-H9	2-3/32	2-3/16	13/16	R.	1 11/32	45	1 13/32	45	.372	.015H	.015H	††	13B...	5 1/4B	.015	.025	6B...	2 1/2B.	Au.	A.	2	1 3/32	6	13 1/4	1/4 ± 3/4	-1/4, +1	0-1/4	3 1/2-4 1/2	1
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R.	1 11/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B	.015	.025	10B.	4 1/2B.	Au.	A.	2 1/4	1 5/8	8	17	1/4 ± 3/8	-1/4, +1	0-1/4	3 1/2-4 1/2	2
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R.	1 11/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B	.015	.025	10B.	4 1/2B.	Au.	A.	2 1/4	1 5/8	8	17	0 ± 3/8	-1/4, +1	0-1/4	4 1/2-5 1/2	3
OH	S...	106	AC-H9	2-3/32	2-3/16	7/8	R.	1 11/32	45	1 7/16	45	.372	.015H	.015H	††	14B...	6B	.015	.025	10B.	4 1/2B.	Au.	A.	2 1/4	1 5/8	8	17	0 ± 3/8	-1/4, +1	0-1/4	4-5	4
BH	S...	(g)	AC-K7	2-1/8	2-5/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/2B.	Ad.	A.	2.46	2 3/32	7	25	(c)	(d)	3/32-9/32	(e)	5
BH	S...	170x	AC-K7	2-1/8	2-5/32	7/8	F..	1.87	45	1.62	45	.341	AA...	AA...	0	TC...	TC...	.015	.027	5B...	2 1/2B.	Ad.	A.	2.46	2 3/32	7	25	0 ± 1/4	0-1/2	1/32-3/32	5°38′	6
BH	S...	145x	AC-G7	3-3/32	1-3/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.021	.025	10B.	3B...	Ad.	B.	2 1/2	2 1/4	9	17	0 ± 1/4	0-1/2	1/32-3/32	5°38′	7
OP	S...	154x	AC-G6	3-3/32	1-3/32	7/8	P..	1.51	45	1.39	45	.339	AA...	AA...	0	TC...	TC...	.016	.025	4B...	1 1/4B.	Ad.	B.	2 1/2	2 1/4	10	24	0 ± 1/4	0-1/2	1/32-3/32	4	8
OH	O...	112	AC-K11	2-1/8	1-3/16	7/8	R.	1 11/32	30	1 15/32	30	11/32	.006H	.013H	.006	9B...	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 3/16	1 5/8	5	14	2 3/4 ± 1/2	1 ± 1/2	3/16-1/8	7°10′	9
OH	O...	112	AC-K11	2-1/8	1-3/16	7/8	R.	1 11/32	30	1 15/32	30	11/32	.006H	.013H	.006	9B...	3 1/4B.	.020	.040	5B...	1 3/4B.	Au.	A.	2 3/16	1 5/8	5	14	0	1/4-3/4	1/8-1/8	7 3/4	10
LH	G...	155x	Ch-J-8	2-1/8	2-3/16	13/16	F..	1 13/32	45	1 17/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/8	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	11
LH	G...	155x	Ch-H-10	2-1/8	2-3/32	13/16	F..	1 13/32	45	1 15/32	45	.340	.006H	.010H	.011	2B...	3/4B..	.018	.025	3A...	1 1/4A.	Au.	A.	2 1/16	1 3/8	6	22	1 1/2	(a)	0-1/8	4 1/2-6	12
LH	G...	150x	Ch-H-10	2-1/8	2-3/32	13/16	F..	1 13/32	45	1 15/32	45	.340	.006H	.010H	.011	2B...	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 3/16	1 3/8	6	21	2	(a)	0-1/8	4 3/4-6	13
LH	G...	150x	Ch-H-10	2-1/8	2-3/32	13/16	F..	1 13/32	45	1 15/32	45	.340	.006H	.010H	.011	2B...	3/4B..	.018	.025	5A...	2A...	Au.	A.	2 3/16	1 3/8	6	17	2	1/4-3/4	0-1/8	4 1/2-5 1/2	14
LH	G...	110	Ch-J-9	2-3/32	2-3/32	7/8	F..	1 13/32	30	1 23/32	45	.342	.009	.009	.016	7 1/2B.	3 1/2..	.015	.025	3 1/2B.	1 1/4..	Au.	A.	2	2 3/16	7	28	1-2 1/2	1	0-1/8r	6	15
LH	G...	....	Ch-H-10	2-3/32	2-3/32	7/8	F..	1 13/32	30	1 23/32	45	.342	.009	.009	.016	7 1/2B.	3 1/2..	.015	.025	3 1/2B.	1 1/4..	Au.	A.	2	2 3/8	△7	28	1-2 1/2	1	0-1/8r	6	16
LH	G...	155x	Ch-J-8	2-1/8	2-3/32	13/16	F..	1 13/32	45	1 13/32	45	.340	.008H	.010H	.014	TC...	TC...	.020	.025	2A...	3/4A..	Au.	A.	2 1/8	1 1/4	5	20	1 1/2	(a)	0-1/8	4 1/2-6	17
LH	O...	140x	Ch-J-8	2-1/8	2-3/32	13/16	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A...	2 1/2A	.020	.025	4A...	1 1/2A	Au.	A.	2 1/16	1	5	16	2	1/4-3/4	0-1/8	4 1/2-5 1/2	18
PH	R...	....	Ch-6M	3-1/16	1-3/16	1 1/16	F..	1 1/2	30	1 7/16	30	11/32	.015C	.015C	.025	6B...	2B...	.021	.025	1 1/2"B"	.....	Ad.	..	2 7/16	1 3/4	12	32	3	1	1/4	....	19
OM	O...	150y	Ch-H-10	2-7/32	1-5/32	.687	F..	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2B..	.....	.015	.025	4B...	.....	Au.	..	1.60	1.54	4	15.2	8	1	1/4-1/8	8	20
OM	O...	100	Ch-7	2-3/32	1-5/32	.750	F..	1 11/32	45	1 11/32	45	.310	.013C	.013C	.013	9 1/2B.	3B...	.015	.025	4B...	1 1/4B.	Au.	A.	2	1 11/16	5	22	8	1	1/4-1/8	8	21
OH	R...	115	Ch-7	2-3/32	1-3/16	13/16	R.	1 13/32	30	1 13/32	45	1/8	.010H	.010H	.012	4 1/2B.	1 1/2B.	.018	.025	2B...	3/4B..	....	A.	1 11/16	1 1/8	5	11	4 1/2-8 1/2	1	1/8-1/8	7 1/2	22
OH	R...	120	Ch-J-9	2-3/32	1-3/16 1-5/32	13/16	R.	1 13/32	30	1 21/32	45	1/8	.010H	.010H	.012	2A...	3/4A..	.018	.025	TC...	TC...	....	A.	2 1/16	1 1/8	5	15	4-4 1/2	1	1/8-1/8	7 1/2	23
OH	R...	120	Ch-J-9	2-3/32	1-3/16 1-5/32	13/16	R.	1 13/32	30	1 21/32	45	1/8	.010H	.010H	.012	4 1/2B.	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-1/8	7 1/2	24
OH	R...	120	Ch-J-9	2-3/32	1-3/16 1-5/32	13/16	R.	1 13/32	30	1 21/32	45	1/8	.010H	.010H	.012	4 1/2B.	1 1/2B.	.018	.025	4A...	1 1/2A.	....	A.	2 1/16	1 1/8	5	15	3-4	1	1/8-1/8	7 1/2	25
HM	G...	110	Ch-J-8	2-3/32	2-3/16	3/4	F..	1 3/8	45	1 3/8	45	3/8	.006	.008	.010	10 2/3B.	4B...	.020	.022	TC...	TC...	Au.	A.	1 13/16	1 3/8	5	13	0-1/2	1-1 1/2	0-1/4	7	26
HM	G...	110	Ch-H-10	2-3/32	2-1/16	3/4	F..	1 1/2	45	1 3/8	45	3/8	.006	.008	.010	10 2/3B.	4B...	.020	.022	TC...	TC...	Au.	A.	1 13/16	1 3/8	7	20	0-1/2	1-1 1/2	0-1/4	7	27
BH	S...	155x	AC-K7	2-1/8	2-3/32	7/8	F..	1 7/8	45	1 5/8	45	.341	AA...	AA...	AA	TC...	TC...	.015	.026	5B...	2 1/4B.	Ad.	A.	2 1/32	2 3/32	7	25	1/4-1	1/4-1	1/32-3/32	4°-51′	28
OM	O...	105	Ch-7	2-1/16	2-3/32	7/8	F..	1 11/32	45	1 11/32	45	1/8	.004C	.006C	.004	21B...	6 3/4B.	.015	.022	7B...	2 1/4B.	Au.	B.	2 1/2	2	12	32	8	1	1/4-1/8	7 1/2	29
OM	O...	100	Ch-H-10	2-7/32	1-5/32	11/16	F..	1.54	45	1.54	45	.311	.013C	.013C	....	19 1/2B.	6 1/4B.	.015	.029	4B...	1 1/4B.	Au.	A.	2 1/8	1.57	6	27	4	3/4	1/4-1/8	4	30
BH	G...	100	AC-45	2-1/8	2-3/32	7/8	F..	1 3/4	45	1 13/32	45	.372	.008H	.015H	.008H	24B...	4 1/4B.	.022	.027	4Bm.	1 1/4B	Au.	A.	2	1 23/64	7	17	2 1/2	1 1/2	1/8	7	31
BH	G...	.90	AC-45	2-1/8	1-1/8 1-3/16	7/8	F..	1 31/64	45	1 13/32	45	.372	.008H	.015H	.008H	20B...	7 1/2B.	.020	.027	9Bm.	2 1/2B.	Au.	B.	2	1 11/64	7	18	2	1 1/2	1/8	7	32
BH	G...	100	AC-G8	2-1/8	2-3/32	7/8	F..	1 31/64	45	1 13/32	45	.340	.015	.015	.015	5A...	1 1/2A.	.022	.025	TC..	TC...	Au.	A.	2	1 23/64	6	20	2 1/2	1 1/2	1/8	7	33
BH	S...	146x	AC-K9	2-1/16	2-3/16	11/16	P..	1 1/8	30	1 23/64	45	11/32	.008H	.011	(k)	5B...	2B...	.020	.040	TC...	TC...	Au.	A.	2 1/16	1 5/8	6	16	0-N3/4	1/4-1	1/8-1/8	4°51′	34
BH	S...	152x	AC-K9	2-1/8	2-3/16	11/16	P..	1 1/8	30	1 23/64	45	11/32	.008H	.011	(n)	TC...	TC...	.015	.030	2B...	3/4B..	Au.	A.	2 1/8	1 5/8	7	20	0-N3/4	1/8-1	1/8-1/8	4°51′	35
H...	O...	110	AC-Y4 (z)	2-1/16	1-3/16	7/8	F..	1.57	30	1.40	45	.340	.007H	.010H	....	5B.....	.....	.015	.025	4B...	1 1/2B.	Au.	..	2 3/32	1 1/4	7	17	2 1/2 ± 1/2	1 ± 1/4	1/4 ± 1/4	1 1/2	38
H...	O...	110	AC-Y4 (z)	2-1/16	1-3/16	7/8	F..	1 13/32	30	1 13/32	45	.340	.007H	.010H	....	5B.....	.....	.015	.025	7B...	2 3/4B.	Au.	A.	2 3/32	1 1/4	7	20	2 1/2 ± 1/2	1 ± 1/4	1/4 ± 1/4	1 1/2	37
H...	O...	110	AC-Y4 (z)	2-1/16	2-3/32	7/8	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	....	30B...	9 3/4B.	.015	.025	6B...	2 1/2B.	Au.	B.	2 1/16	1 3/32	8	24	2 1/2 ± 1/2	1 ± 1/4	1/4 ± 1/4	1 1/2	38
BPH	O...	110	AC-Y4 (z)	2-1/16	2-3/32	7/8	F..	1 31/64	45	1 13/32	45	.340	AA...	AA...	....	TC...	TC...	.020	.025	6B...	2B...	Au.	B.	2 3/32	2 1/4	10	40	(b)	1 ± 1/4	1/4 ± 1/4	1 1/2	39
Ste.	R...	80	Ch-J-6	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 3/8	45	.372	AA...	AA...	.010	5A...	1 1/2A.	.018	.025	2B...	1/2B..	Ad.	A.	2 1/4	1 1/4	10	25	1 1/4	1	1/8	8	40
Ste.	R...	85	Ch-J-6	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 3/8	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/2	13	38	1 1/4	1	1/8	8	41
Ste.	R...	85	Ch-J-6	2-1/16	2-3/32	7/8	F..	1 23/64	45	1 3/8	45	.372	AA...	AA...	.004	19B...	6B...	.018	.025	5B...	1 1/2B.	Ad.	A.	2 1/8	1 1/2	13	38	1 1/4	1	1/8	8	42
LH	O...	145x	Ch-J-8	2-1/16	2-3/32	13/16	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A...	2 1/2A.	.020	.025	4A...	1 1/2A	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/8	4 1/2-5 1/2	43
LH	O...	145x	Ch-J-8	2-1/16	2-3/32	13/16	F..	1 13/32	45	1 13/32	45	.340	.006H	.008H	.011	6A...	2 1/2A.	.020	.025	4A...	1 1/2A.	Au.	A.	1 13/16	1	5	15	1-3	1/4-3/4	0-1/8	4 1/2-5 1/2	44
HM	S...	141x	AC-K7	2-1/16	1-3/16	11/16	R.	1 13/32	30*	1 15/32	45	.310	.012H	.012H	.015	5B...	2B...	.020	.025	4B...	1 1/2B.	Au.	A.	2	1 1/8	8	16	N3/4-1 1/4	3/4-1 1/4	0-1/16	4 1/2-5	45
HM	S...	141x	AC-K7	2-1/16	1-3/16	11/16	R.	1 13/32	30	1 13/32	45	.310	.012H	.012H	.015	5B...	2B...	.018	.025	4B...	1 1/2B.	Au.	A.	2	1 1/16	7	19	N3/4-1 1/4	3/4-1 1/4	0-1/16	4 1/2-5	46
LH	R...	105	Ch-8	2-1/16	1-3/16	7/8	R.	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 3/16	1 3/16	5 1/2	13	1 1/2	1/2	1/8-3/16	5 1/2	47
LH	R...	105	Ch-8	2-1/16	1-3/16	7/8	R.	1 15/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	2B...	3/4B..	Au.	A.	2 3/16	1 3/16	5 1/2	13	(a)	1/2	1/8-3/16	5 1/2	48
LH	R...	....	Ch-8	2-1/16	1-3/16	7/8	R.	1 13/32	45	1 3/32	45	11/32	.016C	.016C	.020	15B...	5 1/2B.	.020	.025	TC...	TC...	Au.	A.	1 7/8	1 1/16	8	15 1/2	(a)	1/2	1/8-3/32	5 1/2	49
BH	G...	110	Ch-J-8	2-3/32	2-3/16	3/4	F..	1 3/8	45	1 3/8	45	3/8	.006	.008	.010	10 2/3B.	4B...	.020	.022	TC...	TC...	Au.	A.	1 13/16	1 3/8	5	13	0-1/2	1-1 1/2	0-1/8	7	50
BM	G...	.87	Ch-C-7	3-3/32	1-3/16	13/16	F..	1 17/32	45	1 15/32	45	.371	.004H	.006H	.010	TC...	TC...	.020	.025	5A...	1A...	Au.	A.	1 7/8	1 13/16	4	11	3	2	3/32	7 1/2	51

MAKES OF UNITS

‡—Owen-Dyneto for Generator and Starter
A—Autolite
AC—AC Spark Plug Co.
BA—Burgess or AC
B&B—Borg and Beck
BH—Bendix, Hydraulic
BM—B3ndix, Mechanical
BO—Buffalo or Oldberg
BPH—Bendix, power operated, hydraulic
BS—Briggs & Stratton
Buf—Buffalo Pressed Steel
Bur—Burgess **Car**—Carter
CG—Chandler-Groves
Ch—Champion
Col—Columbia
D—Delco-Remy
DA—Delco-Remy Generator and Starter, Auto.ite Coil and Distributor
Del—Delco
Dia—Continental Diamond Fiber
DL—Detroit Lubricator
Det—Detroit **Exi**—Exide
F-O—Float-O **G**—Gemmer
Ge—General Electric Co.
Han—Handy
HM—Bendix hydraulic and mechanical combined
Ill—Illinois
LB—Link Belt
LH—Lockheed hydraulic
Mar—Marvel **Mec**—Mechanics
Mor—Morse Chain Co.
Nat—National
NS—Noblitt Sparks
O—Own
OH—Own hydraulic
Old—Oldberg
OM—Own, mechanical
OP—Own, power operated
Os—Own, semi-centrifugal
PD—Presto-Lite or Delco
Pur—Purolator
R—Ross
S—Saginaw
SC—Stromberg or Carter
SM—Stromberg or Marvel
Spi—Spicer
Ste—Stewart-Warner
Str—Stromberg
Th—Thompson Products
Til—Tillotson
Tim—Timken
UP—Universal Products
Wal—Walker
WG—Warner Gear
Whit—Whitney **Wil**—Willard

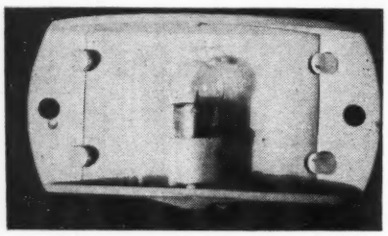
Craftstyle for Fords

A combination of molding and beading used to accentuate the lines of the Ford Car has been introduced by the Metalcraft Corporation, 5127 Penrose Ave., St. Louis, Mo. It consists of a

streamlined radiator grille and a series of raised molding strips which are carried back along the panels of the doors and sides of the body, ending in a narrow, graceful sweep at the rear. The upper and lower beading of both the grille and the molding is of stainless steel, and the intervening beads are finished in a bone white which can be left in this color or painted to suit the individual taste.

New Clearance Light For Trucks Introduced

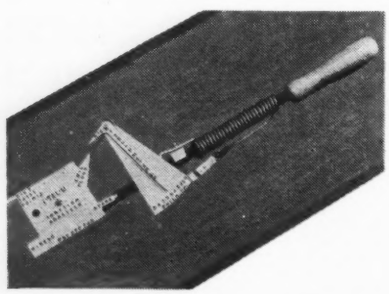
An unbreakable clearance light for trucks has been developed by the National Automotive Mfg. Co., 1806 South Michigan Ave., Chicago, Ill. It



is constructed of heavy gage metal and fits flat against the body of the truck. A Pyralin lens is set well back from the heavily plated metal, assuring complete protection against breakage. The light is supplied with either red, green or amber lens.

Low-Priced Electrical Analyzer Announced

A new electrical analyzer that sells for $3.65 has been developed by I-Tell-U Meter Co., 3216 Baring St., Philadelphia, Pa. It is made of alumi-



num castings, and includes a neon tube, trouble light, spark plug tester, coil and condenser tester, and provision for testing all electrical units of the car. Sold on a 10-day trial offer.

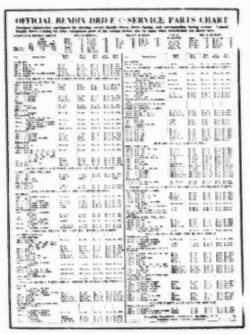
Piston Expander Fits All Models

A new piston skirt expander that can be installed without removing the piston pin or connecting rod has been developed by the Brintbury Mfg. Co.,

34 S. St. James St., Waukegan, Ill. A notch is cut on the left side of the piston slot and the expander is fitted from inside of the piston slot. One size expander fits all models.

Bendix Drive Chart

A quick-reference wall chart showing list prices and the correct model application of genuine Bendix starter drives, as well as the correct spring, spring screws and lock washers for servicing the more popular cars and trucks has been made available to re-



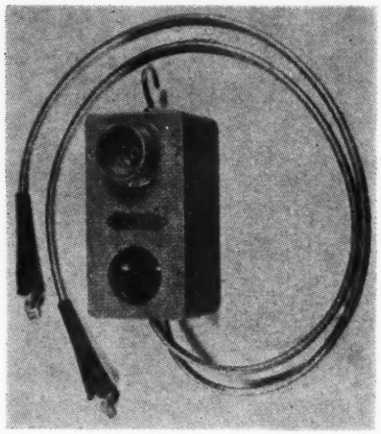
pairmen by the Eclipse Machine Co., Elmira, N. Y. Write for your copy, or contact your Bendix Drive dealer.

Pneumatic Polishing Head

The possibility of injury to the finish of a car when polishing with a hard polishing head has been eliminated through the development of pneumatic polishing heads by Air Products Co., 225 Sixth St., Rockford, Ill. The polishing head is constructed of fabric and rubber and is propelled by a rubber covered shaft which fastens to both top and bottom. The purpose of the air chamber is to produce a cushion that will give the desired flexibility and softness needed. Detachable covers are available, which can be removed and laundered; they are supplied in felt, lambswool and cotton. When ordering polishing head, specify make of polishing machine used so that the correct adapter will be supplied. Price $13.95 complete with adapter and three covers.

New Engine Performance Indicator for Trouble Shooting

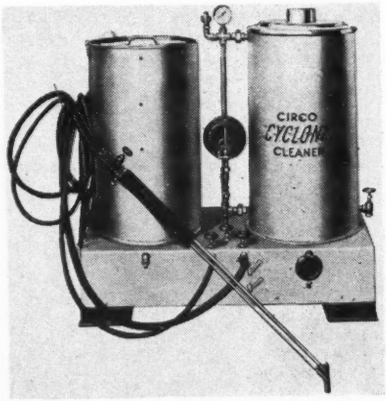
An electrical trouble shooting tool, designed to quickly locate fouled or worn out spark plugs, or plugs improperly spaced, weak or defective



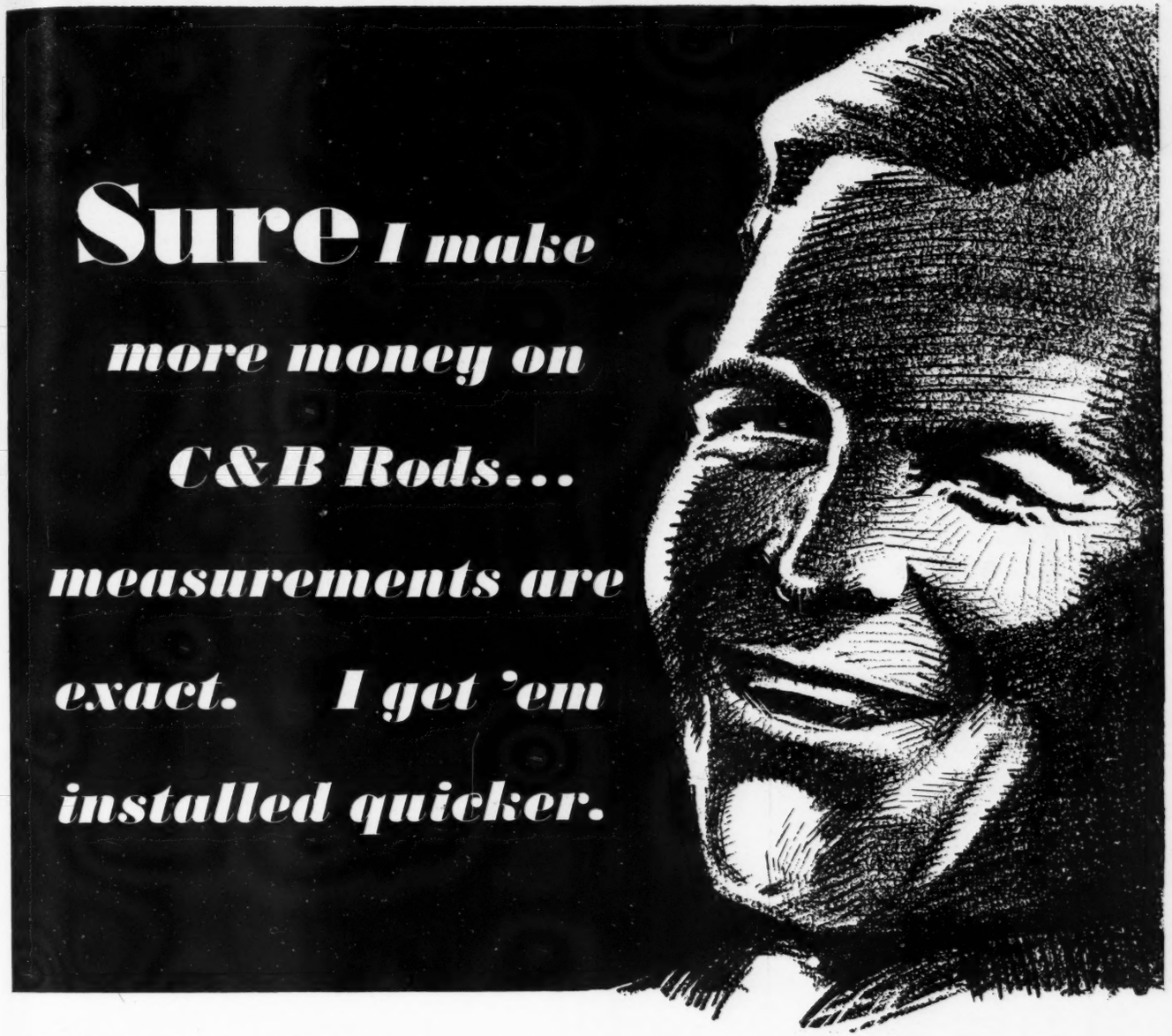
coils and electrical losses through defective wiring, has been developed by the Performascope Company, 585 20th St., Oakland, Cal. Known as the Performascope, the instrument is neat in appearance, easily portable, and requires no electrical knowledge to operate.

Cyclone Cleaner Announced by Circo

The Circo Products Co., 3088 W. 106th St., Cleveland, Ohio, has announced a new Cyclone cleaner for cleaning automobile truck, bus and



passenger car motors; for cleaning of the undercarriage and for stripping paints, road oils, caked grease, etc. The cleaning vapor is produced in a gas-fired generator, and passes through the nozzle of the cleaning gun at high velocity. This action syphons the cleaning solution from the tank, heating it as it vaporizes and sprays it on the work being cleaned. For complete information write the manufacturer.



CLAWSON & BALS, Inc., 4701-03-07-09 W. Lake St., Chicago

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Coil Merchandiser

A new coil merchandiser called the American-Bosch Counterboy is being offered to dealers by United American Bosch Corp., 3664 Main St., Springfield, Mass. It holds and displays six American-Bosch coils, and contains a display card. On one side of the card is a recommendation chart while the other side contains a selling message about coils. The Counterboy is offered with no extra charge in connection with the purchase of the new American-Bosch Ready-to-install Safety Coils.

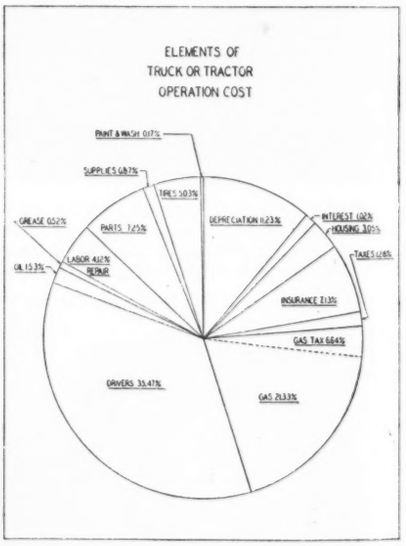
Bluprint Lubrication Service

A new lubrication service has been developed by The Bingham Co., 1315-29 Cherry St., Philadelphia, Pa. It consists of a compact handbook, 5 x 7⅞ in. in size, containing blueprint diagrams of all cars and models for 1936 and 1937 showing points of lubrication, and several pages showing capacities of engine, transmission, differential, cooling system and gas tank units. In addition to the handbook, the service includes a complete merchandising plan with all the necessary material to put it in operation. The handbook sells for $3, and the complete service including the handbook sells for $7.95.

Truck Operating Costs

First cost of a truck is relatively less important than truck operators customarily believe, according to a detailed analysis of the whole subject of truck accounting completed by the Autocar Company. This company has encountered many truck owners who had no precise idea of costs of operation, and has for many years provided, on request, a model form of truck accounting.

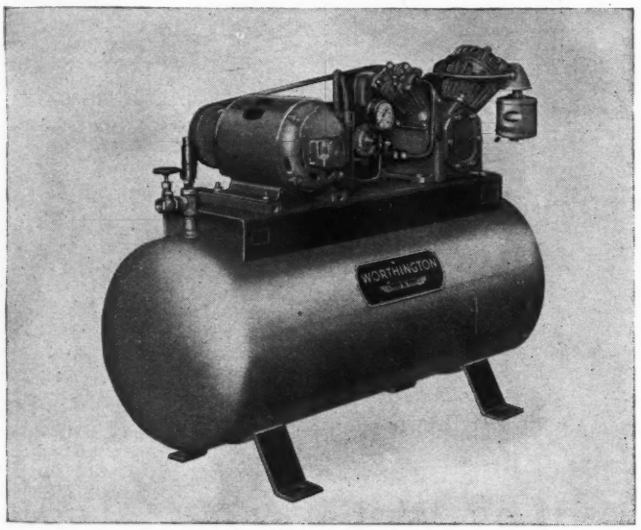
The cost of a truck is reflected in depreciation and interest, which together amounted to only 12.25 per cent of the total annual outlay. Drivers' wages and gasoline, on the other hand, represent 56.80 per cent and are roughly the same for all trucks of similar capacities, regardless of first cost. Parts, tires, repairs, oil, and so forth, are items which are smaller in the case of a correctly engineered truck, no matter what the truck's first cost.



Elements of truck or tractor operation cost, in order of their size, are found by the Autocar study to be as follows on a percentage basis: Drivers, 35.47; gasoline, 14.69; gasoline taxes, 6.64; depreciation, 11.23; parts, 7.25; insurance, 7.13; tires, 5.03; repair labor, 4.12; housing, 3.05; oil, 1.53; taxes, 1.28; interest, 1.02; supplies (chain, hand tools, soap, etc.), .87; grease, .52; and painting and washing, .17.

The one vital fact in truck operation, the company points out, is to carry goods satisfactorily at the cheapest rate per ton. Realization of costs is an essential to ascertaining the correct ton-mile rate of transportation.

air...

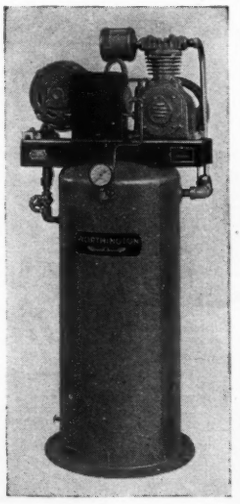


1.35 to 45 cu. ft. per min.

150 to 200 lb. pressure

¼ to 10 horsepower

- AN UNINTERRUPTED SUPPLY
- FULL CAPACITY, AT LOWEST OVERALL COST
- A PRIME REQUIREMENT FOR READY BUSINESS-BUILDING SERVICE



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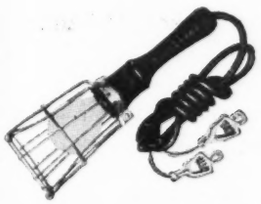

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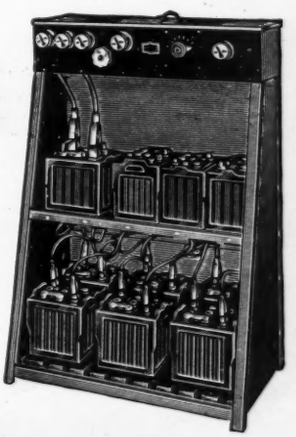

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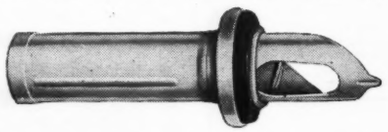
Motorola Announces All-Purpose Radio

A new all-purpose radio that can be used with a 6-volt battery or on 110-volt circuit has been announced by the

Galvin Mfg. Corp., 847 W. Harrison St., Chicago, Ill. It has 6 tubes, superheterodyne, with 6 in. permanent dynamic speaker, 3-gang tuning condensers, tone control, and operates efficiently on a short aerial. Can be used in a trailer or on outings. List price $49.50.

Combination Can Opener and Spout

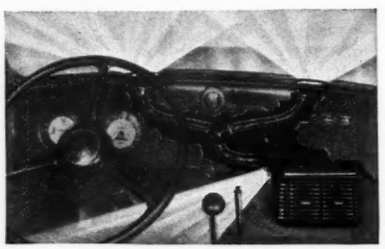
A new oil can opener and pouring spout has been announced by E. Edelmann & Co., 2332 Logan Blvd., Chicago, Ill. It is made of high grade tempered steel of white nickel finish. The patented pierce-type cutter opens the can quickly and easily, and the top



of the cutter is cushioned with a cork gasket so that the can will not drip or spill.

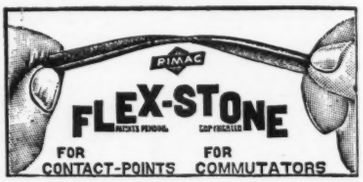
Red Head Car Heater Line Offered for 1937

The new line of Red Head car heaters manufactured by Associated Parts Mfg. Corp., 144-156 Spencer St., Brooklyn, N. Y., combines summer and



winter air-conditioning. The new Red Head Aerotherm has four special features; a power heater delivering 150 cubic feet of warm air, a defroster attachment shooting 35 cubic feet of warm air against the windshield, a stream of hot air flowing directly on the drivers feet when desired, and by shutting off the hot water valves the fan circulates cool air at the rate of 150 cubic feet per minute throughout the car's interior.

THE STONE THAT BENDS!



Flextone is a thin, hard, flexible stone. Not brittle. It cuts and dresses the hardest of Tungsten Points that no steel file can "take". It bends into awkward corners.

Durable • Waterproof
Inexpensive

Ask Your Jobber

RINCK-McILWAINE, Inc.
16 Hudson St. New York City

The Ferodo line is complete . . .
Sets — Roll Linings — Brake Blocks — Clutch Facings.

FERODO
BRAKE LININGS

KEASBEY & MATTISON COMPANY AMBLER, PEN'A

HACKETT *Universal* ROLLER

NOW IN BIG DEMAND

New Type Universal Blade, fits all arms. Blade rolls in action, no bending of rubbers. 7-ply wiping features give 100% wiping, therefore, clear vision at all times.

HACKETT AUTOMOTIVE ACCESSORIES CORP.
Providence, R. I. U. S. A.

Mfrs. of Wiper Arms, Dual Wiper Attachments, Inside Wipers, License Plate Frames, Cigar Lighters, Magnetic Trouble Lights, Shimmy Stops, Parking and Fender Guides, etc.

TRADE MARK
NOC-OUT HOSE CLAMPS
THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable - one size equals many. Quick tightening, perfect seal. At all Jobbers.

Pat. No. 1,382,813.

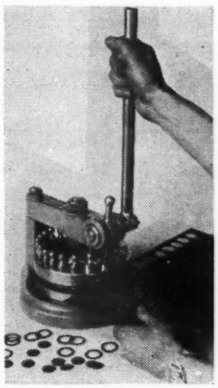
WITTEK MFG. CO.
4305 W. 24th Pl., Chicago, U. S. A.

Spark Plug Gap Setter

A new spark plug gap setter and gage has been introduced by the Electric Auto-Lite Co., Champion & Chestnut Sts., Toledo, Ohio. In addition to

the gage and setting features, the tool is equipped with a magnifying glass for a close inspection of the condition of the points. A merchandising tool as well as a working tool. It is made of a light-weight die-cast metal with polished chrome finish, the outer rim containing six different cap measuring prongs and a hook by which the electrode can be adjusted.

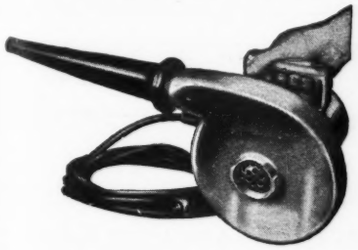
New Washer Punch



The new washer punch illustrated cuts washers out of metal, fabric, gasket material, fibre, steam packing, straw-board, asbestos, leather, felt, cork, rubber bakelite or mica up to 1/16 in. thickness. With the 18 hardened dies furnished with the machine it is possible to obtain 150 different washer sizes. The washer punch is a product of the Ideal Commutator Dresser Co., 2065 Park Ave., Sycamore, Ill.

"Jumbo" Cleaner Has 3-Way Application

A combination vacuum cleaner has been announced by Ideal Commutator Dresser Co., 1221 Park Ave., Sycamore, Ill. Special attachments pro-



vide for use as a normal vacuum cleaner, a blow gun for blowing dry air into places hard to clean, or for spray painting. For complete information and prices, write the manufacturer.

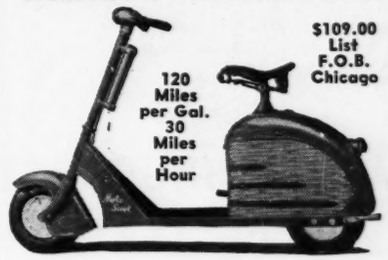
Cylinder Ridge Reamer Prevents Damage

A new cylinder ridge reamer introduced by the Hall Manufacturing Co., 1600 Woodland Ave., Toledo, Ohio, is said to make it impossible for the operator to tip the reamer and gouge the cylinder wall, and prevents chips or cuttings from dropping onto a roller and becoming embedded in the cylinder wall. The cutter is located behind and on a direct line with one of the three centering rollers, and as the reamer is turned it automatically feeds to the top of the cylinder. This new No. 215 Hall Ridge Reamer handles a

range of 2.600 in. to 4 in., and comes complete with driver in a metal box, priced at $12.50.

Easy "RENTALS" Make FAST PROFITS with MOTO SCOOT

EVERYONE IS MOTO SCOOTING



SERVICE STATIONS! REPAIR SHOPS!

You've got the Overhead. Here are the profits. Why not get in on the PROFITS that MOTO SCOOT represents. Rents just like a bicycle with a new thrill. Operators everywhere are making money renting and selling. Get on the bandwagon with the Biggest Money Maker of them all.

Write or wire Dept. MA-8 for FREE Booklet.

MOTO SCOOT MFG. CO.
219 S. WESTERN AVE.
CHICAGO, ILL.

Equipment Catalog Available

The Ideal Commutator Dresser Co., 2065 Park Ave., Sycamore, Ill., has issued a new catalog showing their repair equipment and giving valuable information on materials and methods which save money. Write for your copy.

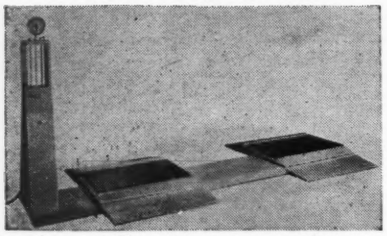
GAS FILTERS
TEMPERATURE GAUGE PARTS
SHOCK ABSORBER PARTS AND TOOL
CARBURETOR PARTS, TESTERS & REPAIR TOOLS
FUEL PUMP PARTS, TESTERS & REPAIR TOOLS
SPEEDOMETER SHAFTING, PARTS AND TOOLS
HY-FLEX FUEL LINES & FITTINGS
HEAT RISER SLEEVE & REPAIR TOOL
SLIP-GRIP SPARK PLUG TERMINAL
Hygrade Line
AUTOMOTIVE PRODUCTS
"The Business Building Line"

FIRST to make "specialization" practical for the trade in general, Hygrade today maintains its leadership in these once "neglected" fields—a true "Quality" line affording the most complete coverage plus scientific merchandising and a catalog system that has no equal.

Write for interesting particulars

HYGRADE PRODUCTS CO.
516 West 34th St. NEW YORK

ACCO - SHURTEST BRAKE TESTER



POSITIVE HYDRAULIC ACTION MOTOR DRIVEN

AT A PRICE YOU CAN AFFORD

SHOWS THE EXACT CONDITION OF EACH BRAKE

NO PITS

NO RAMPS

NO EXPERT OPERATOR REQUIRED

SIMPLE IN CONSTRUCTION

SIMPLE IN OPERATION

AUTOMOTIVE PRODUCTS CORPORATION

Manufacturers of Automotive Service Equipment

59 E. Van Buren St.

Chicago, Ill.

Use This Coupon

Automotive Products Corporation,
59 E. Van Buren St., Chicago, Ill.
Gentlemen:
I am interested in more information on the following products and how I can purchase Acco equipment out of income.

- ☐ Acco Electro-Lift.
- ☐ Acco Frame and Axle Straightener.
- ☐ Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Wheel Balancer.
- ☐ Acco Brake Testers.
- ☐ Acco Aut-O-Meter-Combination Acco Frame and Axle Straightener, and Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Du-O-Meter-Combination Brake Tester and Acco-Meter Wheel and Steering Analyzer.
- ☐ Acco Tri-O-Meter-Combination Aut-O-Meter and Acco-Brake Tester.

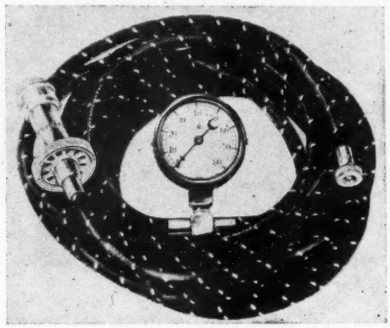
Name .....

Address .....

City .....

Spark Plug Pump

A new time pump that operates from the spark plug opening has been announced by A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn, N. Y. Will operate from any gasoline motor hav-



ing two or more cylinders. Can be used to inflate all types of tires, air mattresses, rubber boats and air pressure tanks, for spraying trees, paint, etc. A standard set consists of 16 ft. of hose, pump with one adapter and pressure indicator. Five adapters to fit pump to all standard spark plug openings, are available.

Motor Stand

The Automotive Maintenance Machinery Co., 2100 Commonwealth Ave., North Chicago, Ill., has developed a

roll-over motor stand with universal holding fixture to handle all 4 and 6 cylinder motor blocks, and provide a safe and convenient method for rebuilding engines. Special brackets are available for holding Ford V-8 motors.

New Shock Absorber Link for Ford Cars

A new shock absorber link for Ford 1935, 1936 and 1937 models has been announced by L. F. Kreger Mfg. Co.,

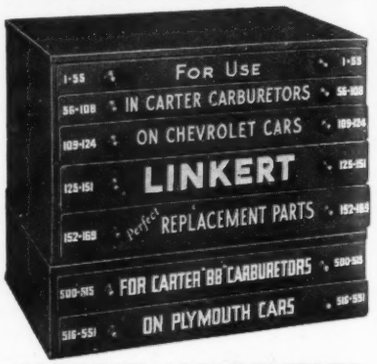
550 West 35th St., Chicago, Ill. This new Kreger item, No. 211, sells at a list price of $.40 each.

YOU NEED THIS LINE

LINKERT

PERFECT ENGINEERED PARTS FOR

CARBURETOR REPLACEMENTS



CORRECT ASSORTMENTS FOR

CHEVROLET AND PLYMOUTH

LANGSENKAMP-LINKER TCARBURETOR CO.

INDIANAPOLIS - INDIANA

THE VULCAN

Manufacturing Company

St. Paul, Minnesota

Makers of ACE-HY Hydraulic Bumper Jack
Light and Heavy Duty Models
and
VULCAN AIR CLEANER
SERVICE UNIT

THE TWIN
POWER RINGS
OF THE
International
LINE-

You can safely put your faith in Chief Power Rings, and when you recondition the cylinders, use Super-Scraper sets. The oil mileage will be amazing.

THE INTERNATIONAL PISTON RING CO.
CLEVELAND, OHIO.

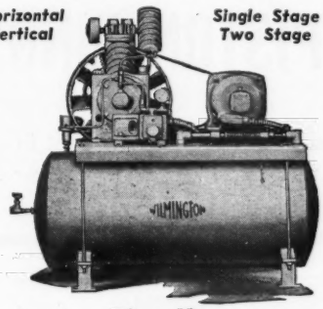
There's Money for You in
Spring Rumble Silencing
with this
SPRING SADDLE SILENCER

Every spring rumble means money to you, for you can install a Spring Saddle Silencer in 15 minutes. It humbles all rumbles, earns you a neat profit. ONE size fits all Chevrolet and Pontiac cars.

CURTISS & SMITH MFG. CORP.
POTTSTOWN, PENNSYLVANIA

WILMINGTON
COMPRESSORS
Since 1903

Horizontal Vertical — Single Stage Two Stage



Give You
HIGH RELIABILITY
with
LOW MAINTENANCE COST

You have an air supply you can absolutely depend upon when you have a Wilmington Compressor in your shop—and at a maintenance cost that's ridiculously low. The non-pulsating check valve lasts years longer than pressure operated types. The motor can't burn out from starting overloads. Air is cleaned to reduce wear, de-oiled to protect tires and hose. Timken bearings. Send for catalog today!

The Auto Compressor Co.
S. Mulberry St., Wilmington, Ohio

Flint the Loss-Proof Compression SPARK PLUG!

The favorite replacement plug with leading garage and service stations because it produces maximum power not only in the older type of motors but also in the latest type of high-speed, high compression motors.

Order from your jobber!
Write for literature!

C. V. S. Manufacturing Co.
Flint, Michigan

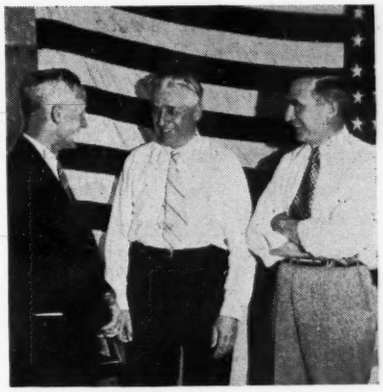
RIESS
Automotive Service Equipment

STEER-O-MASTER
Dynamic Front Wheel Alignment

Heavy Duty Drum Lathes and Grinders
Brake Service Equipment

Money Made With Satisfied Customers
With Our Equipment

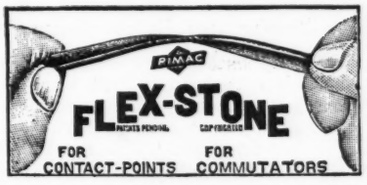
RIESS MFG. CO.
Kokomo, Indiana



Trailer Leaders The men behind the sales guns of Covered Wagon Co. Left to right: D. R. Donaldson, v.-p. in charge of manufacturing; A. G. Sherman, pres., and J. L. Brown, v.-p. in charge of sales.

Flex-Stone For Dressing Points

A new product of Rinck-McIlwaine, Inc., 16 Hudson St., New York City, is a flexible stone for dressing distributor points or sanding armatures.



Combining the qualities of the hardest of grinding wheels with flexibility, the new Flex-Stone is an ideal tool. It will bend and not break, and therefore can be used in places where it is difficult to reach with a file.

"How to Run a Lathe"

The 33rd edition of the machinists' manual, "How to Run a Lathe," has recently been announced by its publisher, The South Bend Lathe Works, South Bend, Ind'ana. The new edition has 160 pages containing the latest authoritative information about the fundamental operations of modern lathe practice. Instructions on every phase of lathe work are given in easily understandable language and accompanied with more than 300 illustrations. Copies are priced at twenty-five cents.

MORE ABOUT BRAKE HEADACHES...

Brakes for Fords need Palmer Devices to cure those servicing headaches.

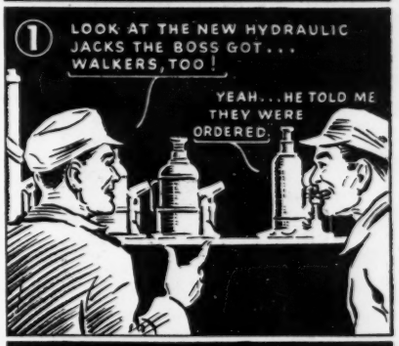
Palmer Devices have been accepted as standard in the brake field because . . . **They Are the Result of Ten Years of Actual Service Work.**

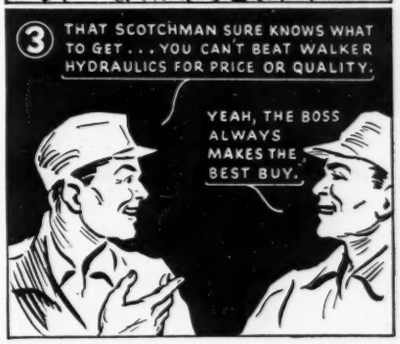
Make this interesting test . . . On a job where you have condemned the lining . . . Install the correct Palmer Device . . . You will be surprised with the result.

Read . . ."There Is A Cure" . . . All about servicing brakes for Fords . . . Yours for the asking . . . Postage prepaid.

PALMER MFG. COMPANY
1479 S. Michigan Ave. Chicago, Ill.

THE BOSS IS A *Scotchman*




3
THAT SCOTCHMAN SURE KNOWS WHAT TO GET... YOU CAN'T BEAT WALKER HYDRAULICS FOR PRICE OR QUALITY.
YEAH, THE BOSS ALWAYS MAKES THE BEST BUY.

The extra value you get in Walker Hydraulics is readily apparent once you see and try these jacks. Their rugged, built-in strength, smooth action and many dominant features assure maximum efficiency and long life. They give you dependable hydraulic power—1½ to 20 tons of it—for all kinds of lifting jobs and heavy-duty shop or bench work that requires pushing, bending, or straightening. One glance at Walker's low prices tells you why they are the best buy in hydraulic jacks. See them at your Walker jobber's.

WALKER MFG. COMPANY, Racine, Wis.
Makers of Walker Electric Lifts and Exhaust Silencers

WALKER
Hydraulic Jacks

The New MOTOSCOPE "400"

"Say, Let's See What It Says About My Engine!"

The dazzling beauty of this new Motoscope "400" *compels* car owners to ask questions — invariably they want to see what it can reveal about *their* cars — and your sale of service and parts is made!

The Stromberg "400" is an entirely new and different motor tester. Its outstanding eye-appeal is matched only by the amazing accuracy of its tests. With it, you can offer a really comprehensive and profitable tune-up job.

Best of all, you'll find it a faithful salesman, working day and night for you, selling more jobs and parts to your present customers and attracting new ones.

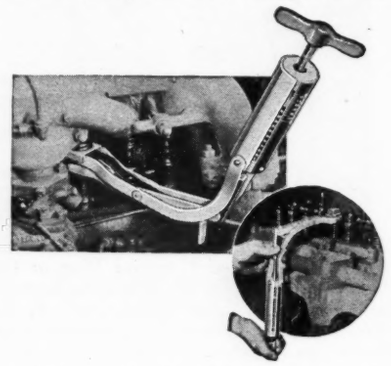
Write for complete information on this new precision analyzer.

STROMBERG MOTOSCOPE CORP.

2709 Belmont Ave., Chicago, Ill.

Sunnen Device Tests Valve Spring Tension

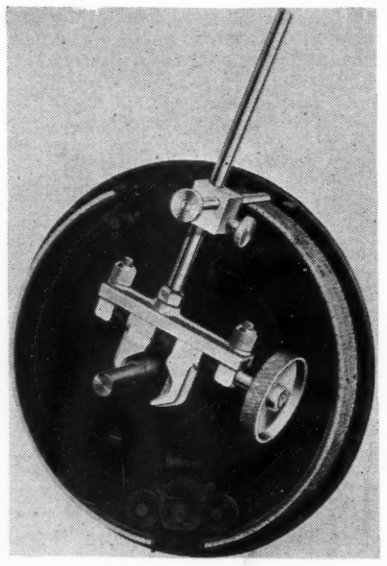
Sunnen Products Co., 7900 Manchester Ave., St. Louis, Mo., has developed an instrument for testing valve spring tension, as one of the



steps in perfecting the motor tune-up job. Tests valve springs without removing the head on L-head or overhead valve type engines except Fords and the V-type motors having blocks set closer than 90 deg. Also tests clutch springs. Instrument gives a direct reading in pounds, which can be checked against a Data Book supplied with the Tester.

New Brake and Drum Gage

The Raybestos Division of Raybestos-Manhattan, Inc., Railroad Ave., Bridgeport, Conn., has announced a new combination brake drum and brake lining gage. The drum gage is used to determine exact diameter measurement, and when removed from the drum is attached to the brake gage. The sliding block on the brake



gage is then set so that the exact diameter is positively transferred to this gage. The drum gage is then removed and the brake gage attached to the axle of the car and adjustment of brakes at proper clearance is assured. The drum gage has a range from 9 to 24 in. One side of the brake shoe gage fits directly on the polished inner bearing surfaces, and the other side fits the taper of rear axles.

SEALED POWER PISTON RINGS

Best in Old Cars! Best in New Cars!

There's Money in Wheel Balancing Service!

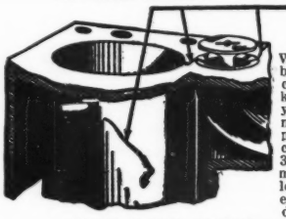
Pat. No. 2036757

Many garages are making hundreds of dollars every year by rendering wheel balancing service. Why not you? The cost of an L & H Balancing Stand and Balancing Weights is surprisingly small—but the profits they will earn are surprisingly large. Investigate!

HARLEY C. LONEY CO.
16517 Wisconsin. Detroit. Mich.

WRITE for CIRCULAR!

WONDER WELD
A Customer-Getter If There Ever Was One



Wonder Weld brings you the customers and keeps them for you. It permanently seals valve port and inside cylinder cracks in 30 minutes, makes unnecessary lengthy, expensive engine teardowns.

MILLER MFG. CO.
1220 KAIGHN AVE. CAMDEN, N. J.

New Laminated Shim Catalog

The Laminated Shim Co., 21-24 44th Ave., Long Island City, N. Y., has issued a new catalog showing the varied uses of Laminum, which is laminated shim brass. While Laminum has all the advantages of a solid brass shim, it has the added advantage of providing precision adjustments by peeling off the multiple layers of shims either .002 in. or .003 in. at a time.

CLASSIFIED ADVERTISING

Motor Temperature Gauges repaired $1.50. Missing parts replaced. Originators of this service. Factory Methods. Radiator Shutter Thermostats repaired $2.50. United Speedometer Repair Co., Inc., 436 W. 57th St., New York City.

INVENTORS—Protect your rights. Before disclosing your invention to anyone send for free blank form "Evidence of Conception" and instructions. Personal attention given all cases. Lancaster, Allwine & Rommel, 415 Bowen Building, Washington, D. C.

VAC-TRO-VISOR Vacuum controlled Visor. Operated by means of an air switch mounted in the toe board. Entirely automatic, both in operative and inoperative position. Unlimited possibilities. Salesmen and Agents write VAC-TRO-VISOR CO., 3831 N. E. 64th Ave., Portland, Ore.

Radiator, Battery Repairing and all sorts of soldering jobs easily done with

TORIT

ACETYLENE TORCH No. 23

Simply connect to Presto tank. Price, including a set of 4 tips, $6.75. *Order from your jobber.*

TORIT MFG. CO.

290 WALNUT ST., ST. PAUL, MINN.

VICTOR GASKETS

PREDOMINATE in original equipment of motors for passenger cars, trucks, busses, tractors, airplanes, motor boats, and motorcycles.

VICTOR MANUFACTURING & GASKET CO.

P. O. BOX 1333 5750 ROOSEVELT ROAD, CHICAGO, U. S. A.

WORLD'S LARGEST GASKET MANUFACTURER

THE LINE THAT LEADS TO PROFITS

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SHOP EQUIPMENT

Hydraulic Presses, Wrecking Cranes, Car Washers, Jacks, Trestles, Creepers, Oil Spray Guns, etc.

Write for FREE literature.

MANLEY PRODUCTS CORPORATION

State & Hay Sts., York, Penna.

ARROW

DIRECTIONAL SIGNALS

FOG & DRIVING LAMPS

ELECTRIC FLARES

SAFETY EQUIPMENT

The Standard of Safety on the Nation's Highways.

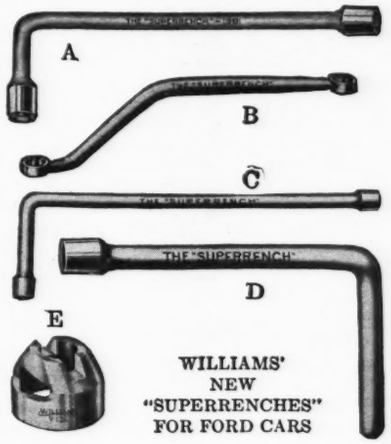
Write for Catalog

ARROW SAFETY DEVICE CO., Inc.

Medford, N. J.

Special Wrenches for Fords

A series of "Superrenches" especially designed for servicing Ford cars and trucks has been announced by J. H. Williams & Co., 75 Spring St., New York City. Referring to the illustration, "A" is for all main bearing screws on 1937 60-hp. job; "B" is for all 1937 distributors and has a special offset to clear the fan belt; "C" is a connecting rod wrench for 60-hp. job; "D" is for 1937 battery clamp nuts; "E" is a crank ratchet socket with 1⅛ in. hex opening for turning back lower fan pulley nut when removing oil pan on the 60-hp. motor.



WILLIAMS' NEW "SUPERRENCHES" FOR FORD CARS

"Yes, lady, I am absolutely sure that this is not Madam Sophie's Beauty Shoppe."

D & T WHEEL BALANCING WEIGHTS

Now made in seven sizes for Passenger cars and two sizes for Trucks for perfect dynamic or static wheel balancing. Neat, inconspicuous, installed instantly without tools. New clip cannot damage tire. Weights will not lose off. Used and recommended by many leading manufactures and jobbers. Write for our new catalog and prices.

TURNER MANUFACTURING CO.

KOKOMO, INDIANA

Job done on time

THANKS TO "ELECTROCOATED" ALOXITE BRAND ALUMINUM OXIDE PAPER AND CLOTH

● There's one sure way to get clean, uniform finishes—FAST. That is to use "Electrocoated" Aloxite Brand Aluminum Oxide Paper and Cloth. For portable sanders, get Aloxite Brand Aluminum Oxide Fibre-Back Discs. Refuse substitutes. Be sure you get *genuine* Carborundum-made products.

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Boston, Detroit, Cleveland, Cincinnati, Pittsburgh, Grand Rapids

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ABRASIVE PRODUCTS

Added PROFITS

• No wonder Gardiner Solders are equally popular with car manufacturers, body builders, garages, repair shops and jobbers. Records everywhere prove that their unvarying high quality and superior performance make them most profitable to sell and use.

Produced in volume . . . under the most modern and efficient manufacturing methods . . . Gardiner Solders are time and material savers because they work faster and go farther. Yet they cost less than "nameless" solders. The Gardiner Line includes Acid and Rosin Core Solders in various alloys and core sizes . . . body, bar and wire solders . . . Permanent Lining Babbitt metal . . . and special solders to meet any specification requirement.

PACKED IN 1, 5 AND 20-LB. SPOOLS

Gardiner METAL CO.

4839 S. Campbell Ave., Chicago, Ill.

FOR QUALITY and DEPENDABLE SERVICE DEMAND FROM YOUR JOBBER

LION DEPENDABLE QUALITY

GUARANTEED AUTOMOTIVE PRODUCTS

LION AUTO PARTS & MFG. CO., INC.
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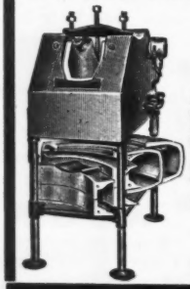

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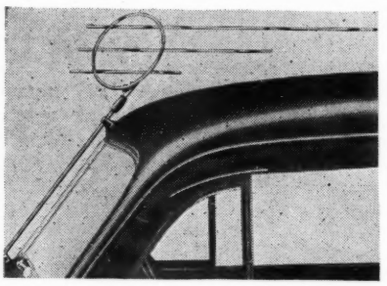
1938 Midwest Show Date Set

The 1938 Midwest Automotive Trade Show will be held March 25, 26 and 27. On the first two days of the Show jobbers will be admitted from 9 A. M. to 1 P. M. The retail trade will attend between 1 P. M. and 10 P. M. On Sunday, the last day, hours will be 1 P. M. to 6 P. M.

J. E. "Stoney" Barr, of Myers Motor Supply Co., is chairman of the new Show Committee. Other members are George W. Arnold, O. B. Gault, Harold Falls, George Lockridge, V. E. Mott and B. J. Oppenheimer. The Committee will be augmented by additional appointments later. C. R. Barnett, executive secretary of the Automotive Trades Association, will continue as Show Manager.

"Clipper" Roof Aerial New Galvin Product

The Galvin Mfg. Co., 847 W. Harrison St., Chicago, Ill., has announced their new "Clipper" roof aerial styled



to match the streamlined vogue and to enhance the beauty of the car. It is said to be the first ornamental aerial ever designed, and is built to give increased efficiency on steel-top cars. Can be installed on every make of car. List price $3.95.

How's Your Oil? Oregon has the first Sun Tan Service Station, where sun tan oil is sprayed over the body. Judging from the photo, it's nice work if you can get it.

Sinko SPIN-UR-WHEEL

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Sell your customers this attractive parking, turning, and backing aid—they want it. Instantly attachable, it fits all steering wheels.

Choice of six colors, with or without Sinko patented jewel insert in ball. Base finished in chrome or baked enamel. Car owners will want oval pear fluted Bez-L-Ball to match on their gear levers, too.

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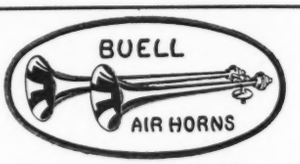

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Jackson, Mich.

"Welding Profits" for You

"Extra Profits from Job Welding" is the title of a new book issued by the Hobart Bros., Hobart Square, Troy, Ohio, makers of welding equipment. It is designed to be of interest and help to individuals who are considering the possibilities of starting in the job welding business or who are interested in planning for increased profits from established job shops. It contains illustrations from actual photographs, and a wealth of valuable suggestions and information. Copies will be sent without charge to anyone writing the publisher and stating why and how he is interested in welding.

New Wheel, Rim Catalog

The National Wheel & Rim Association, 1213 West Third St., Cleveland, Ohio, has recently issued its new catalog No. 1137 containing information on wheels, rims, drums and parts which will be of interest to tire dealers and repair shops. "Changeover Opportunities" is the title of another booklet intended to aid the tire dealer to increase his tire sales. Either of these pieces of literature may be secured without charge by writing the National Wheel & Rim Association.

Hoist Bulletin

The Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis., has issued a new bulletin called "P&H Hoists." Illustrated with more than 25 industrial application photographs, the bulletin describes advantages in handling work on lifts and contains diagrams which explain simplified construction and operation, ratings and operating ranges of various size lifts. Ask for your copy of Bulletin No. H-5.

"How to Solder Perfectly"

The Vulcan Electric Co., 600 Broad St., Lynn, Mass., announces a new 12-page booklet with illustrations, entitled "How To Solder Perfectly." This is a most comprehensive treatise on the correct method of soldering with the hand soldering tool and the solder pot, control and regulation of the heat, with valuable suggestions as to proper care and maintenance of soldering devices.

Celoron Display Board

As an aid to selling more Celoron fibre timing gears, the Continental-Diamond Fibre Co., of Newark, Delaware, has developed a display board designed to hold one timing gear. The display is supplied free with the purchase of the gear, and features "Camshaft Lag" as the cause of sluggish operation of a motor.

THE 60 MINUTE WAY

It's ZECOL today, all over the country. ZECOL is going over big because of its Quality—Attractive Packaging and Price—and because it does a perfect, lasting job so much quicker and easier. You'll *profit* by pushing ZECOL WAX and ZECOL SCUM REMOVER. Ask for details.

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ZECOL WAX

TOO GOOD TO CHANGE!

No important change in basic design has been made in Thexton Expanders since they were introduced to the trade. • That is one of the best evidences of their merit. • Years of nation-wide use, in all kinds of cars and under all conditions, have proved that Thexton Expanders are sound in principle, correct in design, and thoroughly efficient. • You're on safe ground when you recommend Thexton Expanders for positive, permanent and economical cure of piston slap!

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